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ENZOOTIC ABORTION IN EWES

II. Immunisation and Infection Experiments

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Stamp, McEwen, Watt and Nisbet, 1950, described a placentitis of the ewe caused by a virus showing similarities to those of the psittacosis lymphogranuloma group, and Littlejohn, 1950, found the disease to be widespread among "halfbred" (Border Leicester x Cheviot) and Cheviot ewes on lowland and marginal farms in an area of the south east of Scotland. The disease has been diagnosed during the past season in Aberdeenshire (Jamieson, 1950), in Westmorland (Heath, 1950) and in Shropshire (Shaw, 1950), and we have found it in Fife, Angus and Dumfriesshire.

Although abortion is a feature of the disease, lambs with infected membranes may be born prematurely or at full term and sometimes they are normally vigorous. Clinical manifestations are, therefore, of limited value in the interpretation of tests relating to infection or immunity in groups of experimental ewes. The most reliable data are obtained from an examination of the foetal membranes. As the foetal membranes may be lost it was found advisable in some of the experiments described in this paper to slaughter the experimental sheep shortly before the expected lambing date and examine the foetal membranes. In those cases where the ewe aborted or lambed and the foetal membranes could not be found, a diagnosis was based on the presence or absence of elementary bodies in smears made from vaginal swabs. The swabs were taken on the day of parturition and if the result was negative swabbing was repeated on the second and third day.

Yolk Sac Vaccine.—Three different batches of yolk sac vaccine were prepared. One batch was used in Experiment I and in a field vaccination trial. A second batch was used in part 1 of Experiment II and a third batch in part 2 of the same experiment. All these batches were used soon after preparation.

Infective material, containing virus that had been passaged two to four times through the chick embryo, was inoculated into six-day chick embryos and incubation was continued. Embryos dying during the first three days after inoculation were discarded. On and after the fourth day the embryos were examined twice daily and the yolk sacs harvested from those that died between the fourth and eighth day after inoculation. Not more than six yolk sacs at a time were pooled and ground in a Griffith tube; the emulsion was examined microscopically and if rich in "elementary bodies" and free from bacteria it was used for vaccine. The ground yolk sacs were emulsified in a fluid consisting of one part of M/15 phosphate *p*H 7·0 and four parts of physiological saline solution to which formalin had been added to give a final concentration of 0·4 per cent. 10 c.c. of the fluid was used for each yolk sac and the crude emulsion constituted the vaccine which was stored in the cold room for not less than two weeks after which, having been shown to be bacteriologically sterile, it was ready for use.

Foetal Membrane Vaccine.—A ewe in the third month of gestation was inoculated intravenously with infective material. Forty-five days later the animal was slaughtered and bled. The uterus was removed and the foetal membranes collected. The membranes, which showed extensive lesions and were heavily infected with "elementary bodies," were minced, ground in a Premier paste mill and made into a 10 per cent. suspension in the formalinised phosphate saline already described. The suspension was passed through a fine mesh sieve and stored in the cold. Before use it was shown to be bacteriologically sterile. Only one batch of foetal membrane vaccine was prepared.

On microscopical examination the yolk sac vaccines and the foetal membrane vaccine all appeared equally rich in "elementary bodies."

EXPERIMENT I

Yolk Sac Vaccine.—Twelve Dorset Horn ewes in approximately mid-pregnancy were each injected subcutaneously on two occasions and at an interval of 14 days with 5 c.c. of vaccine. On September 9th, 14 days after the second injection, the ewes were divided into two groups, A and B. Six ewes in group A and six control ewes were inoculated subcutaneously with 1 c.c. of a 1:1,000 broth dilution of a third passage infected yolk sac; the six ewes in group B and six control ewes were each inoculated subcutaneously with 1 c.c. of a 1:100,000 dilution of the same yolk sac.

The relevant data on the experiment are summarised in Table I (over-leaf.) Vaccination produced an immunity clearly seen in the group that received the smaller infective dose.

The sheep used in the subsequent experiments, except Experiment III, were young Blackface ewes purchased as unserved animals on October 20th and November 3rd, 1949, from an area where enzootic abortion is not known to occur. The rams were run with the ewes from December 5th, 1949. Later it was found that a number of the sheep had conceived to a service before purchase, but this was not discovered until after the animals had been allotted to different experimental groups, thus necessitating the removal of some sheep from the designed experiments.

TABLE I

IMMUNISATION OF THE PREGNANT EWE BY THE SUBCUTANEOUS INJECTION OF YOLK SAC VACCINE

Group A. Immunity challenged on the 9.9.49 by the subcutaneous inoculation of a " large " infective dose

Vaccinated				Controls			
		Membranes				Membranes	
Sheep	Date of parturition	Macroscopic appearance	Microscopic examination	Sheep	Date of parturition	Macroscopic appearance	Microscopic examination
1	19.10.49	+	+	1	*Killed 24.10.49	—	—
2	28.10.49	+	+	2	26.10.49	+	+
3	3.11.49	—	—	3	29.10.49	Retained	+
4	3.11.49	—	—	4	30.10.49	+	+
5	7.11.49	—	—	5	30.10.49	Retained	+
6	12.11.49	+	+	6	5.11.49	„	+
Total number of sheep 6 Number infected 3				Total number of sheep 6 Number infected 5			

Group B. Immunity challenged on the 9.9.49 by the subcutaneous inoculation of an infective dose 100 times smaller than the " large " infective dose

Vaccinated				Controls			
		Membranes				Membranes	
Sheep	Date of parturition	Macroscopic appearance	Microscopic examination	Sheep	Date of parturition	Macroscopic appearance	Microscopic examination
1	31.10.49	—	—	1	18.10.49	+	+
2	13.11.49	—	—	2	24.10.49	Retained	+
3	13.11.49	—	—	3	26.10.49	+	+
4	24.11.49	—	—	4	3.11.49	+	+
5	27.11.49	—	—	5	5.11.49	+	+
6	3.1.50	—	—	6	13.11.49	+	+
Total number of sheep 6 Number infected 0				Total number of sheep 6 Number infected 6			

+ Under " Macroscopic appearance " = Macroscopic lesions present.
+ Under " Microscopic examination " = Elementary bodies found.

* This ewe had a prolapsed vagina and was, therefore, slaughtered before lambing.

EXPERIMENT II

A COMPARISON OF THE YOLK SAC VACCINE WITH FOETAL MEMBRANE VACCINE

PART 1.—Two groups of ewes (1 and 2) were vaccinated, the one with yolk sac vaccine and the other with foetal membrane vaccine. Each sheep received two subcutaneous injections of vaccine at an interval of 14 days, the second injection being given on November 29th, 1949, seven days before the rams were run with the ewes. Later two further groups of ewes (3 and 4) were vaccinated in the same way, the second injections being given on February 16th, ten to eleven weeks after the rams were first allowed to run with the ewes. The immunity of the vaccinated groups was challenged by the subcutaneous inoculation of a " large " infective dose on March 4th, 1950, 14 weeks and three weeks respectively after vaccination.

Table II, part 1, shows that all four groups of vaccinated animals possessed an immunity but degrees of immunity between the different groups were not demonstrated.

PART 2.—A group of ewes was injected with yolk sac vaccine and another group with foetal membrane vaccine as groups 1 and 2 of part 1 of the experiment. On March 4th, 1950, the immunity of the sheep in these groups was challenged by the subcutaneous inoculation of an infective dose 100 times more dilute than the challenge dose used in part 1. From Table II, part 2, it will again be seen that vaccination produced an effective immunity.

EXPERIMENT III

THE IMMUNITY OF EWES THAT ABORTED OR LAMBED WITH DISEASED FOETAL MEMBRANES IN THE PREVIOUS SEASON (1949)

Ewes found infected at the 1949 lambing season and now carrying their second lamb were divided into two groups. The immunity of one group was challenged during pregnancy by a " large " infective dose. Nothing was done to the other group. The control sheep in Experiment II, part 1, acted also as controls to Experiment III, which experiment is presented in Table III. This experiment indicates that in the pregnancy following an abortion the foetal membranes are not infected; and that previously infected sheep possess a considerable degree of resistance to reinfection. These results are in accordance with field experience (Stamp *et al.*, 1950; Littlejohn, 1950).

TABLE III

EWES THAT HAD HAD LAMBS WITH INFECTED FOETAL MEMBRANES IN PREVIOUS PREGNANCY

Previously infected ewes, not challenged					Previously infected ewes challenged on the 4.3.50 by the subcutaneous inoculation of a " large " infective dose. For controls see Table II, Part 1				
			Membranes					Membranes	
Sheep		Lambed or killed and date	Mac. app.	Mic. ex.	Sheep		Lambed, died or killed and date	Mac. app.	Mic. ex.
1	L	25.4.50	Lost	—	1	L	23.4.50	—	—
2	L	26.4.50	—	—	2	D	25.4.50	—	—
3	K	3.5.50	—	—	3	K	3.5.50	—	—
4	K	„	—	—	4	K	„	—	—
5	K	„	—	—	5	K	„	—	—
6	K	„	—	—	6	K	„	—	—
7	K	„	—	—	7	K	„	—	—
8	K	5.5.50	—	—	8	K	„	+	+
					9	K	„	—	—
Number of sheep in group 8 Number infected 0					Number of sheep in group 9 Number infected 1				

EXPERIMENT IV

THE INFECTIVITY OF THE VIRUS WHEN ADMINISTERED PARENTERALLY BEFORE SERVICE

The virus of ewe abortion being of low pathogenicity for non-pregnant sheep and laboratory animals (Stamp *et al.*, 1950) it was thought probable that inoculation even a short time before service might not result in infection of the foetal membranes. If this were so the inoculated animals might be resistant to infection when they became pregnant.

Table IV, part 1, shows the results obtained from the subcutaneous, intravenous and intradermal inoculation of a " large " dose of virus three weeks before the rams were

Table II—Part 1

Comparison between Yolk Sac Vaccine and Foetal Membrane Vaccine. Immunity challenged on 4.3.50 by the Subcutaneous Inoculation of a "large" Infective Dose

1 Yolk sac vaccine before service. Second injection 29.11.49					2 Foetal membrane vaccine before service. Second injection 29.11.49					3 Yolk sac vaccine after service. Second injection 16.2.50					4 Foetal membrane vaccine after service. Second injection 16.2.50					Controls				
Sheep	Lambed aborted or killed and date		Membranes Mac. app.	Mic. ex.	Sheep	Lambed aborted or killed and date		Membranes Mac. app.	Mic. ex.	Sheep	Lambed aborted or killed and date		Membranes Mac. app.	Mic. ex.	Sheep	Lambed aborted or killed and date		Membranes Mac. app.	Mic. ex.	Sheep	Lambed aborted or killed and date		Membranes Mac. app.	Mic. ex.
1	K	26.4.50	—	—	1	L	26.4.50	—	—	1	K	26.4.50	—	—	1	K	26.4.50	—	—	1	K	14.3.50	—	—
2	K	„	—	—	2	K	„	—	—	2	K	„	—	—	2	K	27.4.50	—	—	2	A	16.4.50	+	+
3	K	27.4.50	—	—	3	K	„	—	—	3	K	27.4.50	—	—	3	K	„	—	—	3	A	„	+	+
4	K	„	—	—	4	K	27.4.50	—	—	4	K	„	—	—	4	K	29.4.50	—	—	4	A	17.4.50	+	+
5	L	„	Lost	—	5	K	„	—	—	5	K	1.5.50	—	—	5	K	1.5.50	—	—	5	K	18.4.50	—	—
6	K	1.5.50	—	—	6	K	1.5.50	—	—	6	K	„	—	—	6	K	„	—	—	6	K	„	—	—
7	L	„	Lost	—	7	K	„	+	+	7	K	5.5.50	—	—	7	K	„	—	—	7	K	„	—	—
8	K	„	—	—	8	K	„	—	—	8	K	12.6.50	—	—	8	K	„	—	—	8	A	19.4.50	+	+
9	K	„	—	—	9	K	5.5.50	—	—	9	K	„	—	—	9	K	„	—	—	9	A	21.4.50	+	+
10	K	„	—	—	10	K	„	—	—											10	K	1.5.50	—	—
11	L	11.6.50	—	—																11	K	„	+	+
No. of sheep in group 11					No. of sheep in group 10					No. of sheep in group 9					No. of sheep in group 9					No. of sheep in group 11				
No. infected 0					No. infected 1					No. infected 0					No. infected 0					No. infected 6				
										1a	L	7.3.50	—	—	1a	L	18.3.50	Lost	—					
															2a	L	24.3.50	—	—					
															3a	L	17.3.50	—	—					

Sheep 1a, 2a, etc., were in lamb before purchase.

Table II—Part 2

Comparison between Yolk Sac Vaccine and Foetal Membrane Vaccine. Immunity challenged on the 4.3.50 by the Subcutaneous Inoculation of an Infective Dose 100 Times Smaller than the Infective Dose used in Part 1

Yolk sac vaccine before service. Second injection on 29.11.49					Foetal membrane vaccine before service. Second injection on 29.11.49					Controls				
Sheep	Lambed aborted or killed and date		Membranes Mac. app.	Mic. ex.	Sheep	Lambed aborted or killed and date		Membranes Mac. app.	Mic. ex.	Sheep	Lambed aborted or killed and date		Membranes Mac. app.	Mic. ex.
1	L	28.4.50	Lost	—	1	L	30.4.50	—	—	1	A	16.4.50	+	+
2	L	29.4.50	—	—	2	L	„	—	—	2	K	20.4.50	+	+
3	L	2.5.50	Lost	—	3	L	1.5.50	+	+	3	K	„	+	+
4	L	3.5.50	—	—	4	L	4.5.50	—	—	4	K	21.4.50	+	+
5	L	7.5.50	—	—	5	L	5.5.50	—	—	5	L	29.4.50	+	+
6	L	8.5.50	—	—	6	L	7.5.50	—	—	6	L	4.5.50	+	+
7	L	10.5.50	—	—	7	L	9.5.50	—	—	7	L	7.5.50	+	+
8	L	12.5.50	Lost	+	8	L	10.5.50	—	—	8	L	9.5.50	—	—
9	L	„	—	—	9	L	20.5.50	—	—	9	L	10.5.50	—	—
10	L	18.5.50	Lost	—	10	L	23.5.50	—	—	10	L	„	+	+
										11	L	12.5.50	+	+
Total number of sheep 10 Number infected 1					Total number of sheep 10 Number infected 1					Total number of sheep 11 Number infected 9				
1a	L	16.3.50	—	—	1a	L	15.3.50	Lost	—					

The sheep 1a were in lamb before purchase.

run with the ewes. In every group, infection of the foetal membranes was produced in some of the animals.

In part 2 of Table IV are records of sheep inoculated subcutaneously before service with a "large" infective dose and again inoculated with a "large" infective dose after service. For the latter inoculation the material used was the same as that given to the controls in Experiment II. None of the eight sheep inoculated with virus before and again after service showed any sign of infection. In view of the proved infectivity of both inoculations this result was unexpected.

that the disease found in the experimental groups grazed on pastures previously used by infected sheep originated in the intentional administration of infective material.

Field Vaccination Trial

Ewes on 14 farms in Berwickshire and Roxburghshire were vaccinated during September, 1949, each ewe receiving two injections of yolk sac vaccine, an approximately equal number of similar sheep being left as controls. The shepherds on the farms were asked to keep a daily record of the abortions occurring in the flocks, *i.e.*, the expulsion of dead or non-viable foetuses about one to three weeks

Table IV

Infectivity of the Virus by Parenteral and by Oral Administration

Part 1																Part 2				Part 3			
Inoculation of "large" dose of virus before service																Subcutaneous inoculation of "large" dose of virus before service, followed by inoculation after service of "large" dose of same virus as used in Experiment II, Part 1				Feeding of 50 grammes of infected membranes 2-3 months after service			
Subcutaneous					Intravenous				Intradermal														
Sheep	Lambed aborted or killed and date		Membranes Mac. app.	Membranes Mic. ex.	Sheep	Lambed aborted or killed and date		Membranes Mac. app.	Membranes Mic. ex.	Sheep	Lambed aborted or killed and date		Membranes Mac. app.	Membranes Mic. ex.	Sheep	Lambed aborted or killed and date		Membranes Mac. app.	Membranes Mic. ex.	Sheep	Lambed aborted or killed and date		Membranes Mac. app.	Membranes Mic. ex.
1	L	27.4.50	—	—	1	A	13.4.50	—	—	1	A	28.4.50	+	+	1	A	17.4.50	—	—	1	A	17.4.50	+	+
2	K	28.4.50	—	—	2	K	29.4.50	+	+	2	K	29.4.50	—	—	2	K	26.4.50	—	—	2	K	18.4.50	—	—
3	A	„	+	+	3	K	„	—	—	3	K	„	—	—	3	K	„	—	—	3	A	23.4.50	+	+
4	A	„	+	+	4	K	„	+	+	4	K	„	—	—	4	K	27.4.50	—	—	4	K	24.4.50	+	+
5	L	„	—	—	5	K	„	+	+	5	K	1.5.50	+	+	5	K	„	—	—	5	K	„	—	—
6	K	29.4.50	—	—	6	K	„	+	+	6	K	5.5.50	—	—	6	K	1.5.50	—	—	6	K	„	—	—
7	K	„	—	—	7	K	„	+	+						7	K	5.5.50	—	—	7	K	„	+	+
8	K	„	+	+	8	K	1.5.50	—	—						8	K	„	—	—	8	K	„	+	+
9	K	„	—	—	9	K	„	+	+											9	K	1.5.50	—	—
10	K	23.5.50	+	+	10	K	„	—	—											10	K	16.5.50	—	—
Total No. of sheep 10 Number infected 4					Total No. of sheep 10 Number infected 6					Total No. of sheep 6 Number infected 2					Total No. of sheep 8 Number infected 0					Total No. of sheep 10 Number infected 5			

EXPERIMENT V

Infection by Ingestion

An experiment was made to determine whether pregnant ewes exposed to infection by ingestion contracted the disease. The dose of infective material given to the ewes was probably greatly in excess of what may be ingested under field conditions. The experiment, summarised in Table IV, part 3, demonstrates that infection can be produced by ingestion.

Controls

The sheep in experiments II and IV were kept from the time of purchase in the autumn of 1949 to March 21st, 1950, on pastures where experimentally infected ewes had aborted or lambed in April and May of 1949, and after March 21st they were placed on pastures used by infected sheep that had lambed in the previous autumn.

It was necessary to consider the possibility that the experimental sheep using these pastures might acquire a natural infection. Accordingly, a group of sheep was left as normal controls. Sixteen pregnant sheep in this group were killed at different dates from April 25th to May 16th. All were in a very late stage of gestation and in no case were the membranes found to be infected. It is concluded

before the expected date of lambing. At a routine weekly visit the losses from abortion were recorded and the data were later compared with and if necessary incorporated in the shepherds' written records of abortions to give the figures in Table V.

Table V

Field Vaccination Trial

Farm No.	No. of vaccinated animals	Aborted	% Abortion	No. of controls	Aborted	% Abortion
1	94	0	0	90	6	6·6
2	53	0	0	53	7	13
3	171	2	1·1	170	19	11·2
4	69	1	1·4	68	2	3
5	60	5	8·3	70	12	17
6	49	2	4·1	49	7	14·3
7	109	3	2·8	176	11	6·2
8	60	2	3·3	63	1	1·6
9	58	3	5·2	63	2	3·2
10	150	2	1·3	201	15	7·5
11	70	2	2·8	70	1	1·4
12	45	0	0	51	3	6
13	36	0	0	37	4	10·8
14	160	7	4·4	140	12	8·5
Totals	1,184	29	2·4	1,301	102	7·8

Results

(*a*) Farms where the incidence of abortion in controls was more than 10 per cent.:—

	Vaccinated	Control	
Aborted	9	49	58
Not aborted	360	330	690
	369	379	748

Percentage abortion for control sheep = 15.
Percentage abortion for vaccinated sheep = 2·5.
$x^2 = 28{\cdot}9$ so that $P < {\cdot}000001$.
Result is very highly significant.

(*b*) Farms where the incidence of abortion in controls was less than 10 per cent.

	Vaccinated	Control	
Aborted	20	53	73
Not aborted	795	869	1,664
	815	922	1,737

Percentage abortion for control sheep = 5·7.
Percentage abortion for vaccinated sheep = 2·4.
$x^2 = 11{\cdot}63$ so that $P < {\cdot}002$.
Result is significant.

In both groups vaccination produced a significant reduction in the abortion percentage, the results being highly significant when the incidence of abortion on the farm as judged by the controls was high. The incidence of abortion in vaccinated animals was about 2½ per cent. in both groups.

Summary

Sheep inoculated either before or after service with formalinised killed vaccine developed an effective resistance to an experimental infection.

Vaccines prepared from yolk sac and ovine foetal membranes appeared equally effective.

The foetal membrane vaccine did not lose its immunising properties on storage for four months, the longest period tested.

Sheep that produced foetuses or lambs with diseased membranes in 1949 lambed normally the following year and were not infected. Similar sheep possessed an effective resistance to experimental reinfection.

The parenteral inoculation of sheep before service produced infection in a number of the animals when later they became pregnant.

The feeding of material from diseased foetal membranes to pregnant ewes reproduced the disease in some of the animals.

A group of normal sheep grazing shortly before and during pregnancy on pastures where abortions had occurred the previous lambing season all lambed normally without infection.

The evidence obtained from a small-scale field vaccination trial showed that vaccination produced a significant reduction in the abortion rate.

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Weekly Wisdom

The supremely important thing is to have an aim in life sufficiently lofty to justify spending your life in endeavouring to reach it.—Aristotle.

THE TREATMENT OF EAST COAST FEVER WITH (A) PHENAMIDINE AND (B) "QUINACRINE"

BY

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Few diseases have resisted treatment so stubbornly as East Coast fever. In the words of Henning (1949), "No drug has so far been found for the treatment of East Coast fever, but it is hoped that further experiments with chemotherapy may yield fruitful results." This article records the results of trials with (*a*) phenamidine and (*b*) "Quinacrine," neither of which had any beneficial effect on the course of the disease.

(A) PHENAMIDINE

Three years ago persistent reports reached the laboratory that farmers were successfully treating East Coast fever with phenamidine,* (M and B 736 : 4 : 4 diamidinodiphenyl-ether). Workers in the field of tropical veterinary medicine probably are familiar with the extravagant claims made, from time to time, by stockowners in favour of one or other medicament in the treatment of animal diseases, and usually it is possible to disregard such assertions with confidence. At this time, however, phenamidine was a comparatively new drug with an impressive record of success in the treatment of the Babesiidae.

Statements of a comparatively reserved character from informed stockowners indicated that phenamidine might at least interfere with the normal course of the disease. For example, in one infected herd of Channel Island cows and heifers, 4·0 to 5·6 grammes of phenamidine (10 to 14 c.c. of 40 per cent. solution) were given in a number of cases after East Coast fever had been confirmed by the writer in blood and gland smears. Although no recoveries took place, it did seem as though the treatment affected the progress of the disease to some extent as judged by very protracted syndromes, recessions of temperature, and a reduction in the number of parasites visible in smears. If a drug can be found which definitely interferes with the development of the parasite in the bovine to the smallest degree, it might provide the chemist with an opportunity of synthesising other and more effective drugs of a similar composition. It was decided, therefore, to infect a number of young susceptible animals with East Coast fever and to assess the value of phenamidine under controlled conditions at the laboratory. A 40 per cent. solution of phenamidine was used and all injections were made subcutaneously.

Experimental

On 1.9.47, 14 susceptible grade steers were isolated and infected nymphae of *R. appendiculatus* placed in the left ears. The ticks fed satisfactorily and commenced dropping from the fourth day onwards. Temperature reactions in three animals (Nos. 2665, 2675 and H727) commenced on 13.9.47 and two days later gland smears from these showed the presence of rare Koch's blue bodies, confirming East Coast fever. By the 14th day after tick infestation, elevated temperatures were recorded in six animals. Since by this time East Coast fever had been recognised in three of the animals, it was decided to com-

* May & Baker Ltd., Dagenham, England.

mence treatment in all six without waiting for confirmation of the disease in the other three. By this means it was hoped to attack the parasites in the very early stages of the syndrome. On 15.9.47, all six bovines (2629, 2665, 2675, H727, 2433 and 2372), weighing 250 to 300 lb., were given 2·0 to 2·4 grammes of phenamidine per 100 lb. liveweight. The next day three animals were found dead and the other three died the same morning, 14 to 18 hours after inoculation with phenamidine. *Post-mortem* examinations showed few lesions other than enlarged degenerated livers, enlarged spleens with soft dark pulps, and congested kidneys with evidence of leucocytic infiltration. In some cases, an examination of gland smears showed an appreciable increase in the number of schizonts, many of which were of the extra-cellular, gamogenous type, described by Cowdrey and Danks (1933) and usually associated with the later stages of the disease. In this connection it should be emphasised that the dead animals had been reacting clinically to East Coast fever only for two to three days, and that they died during a stage of the disease when gamogenous schizonts are usually still comparatively uncommon in gland smears.

Meanwhile, two other steers had commenced to react, one of which (2332) was used to infect a new batch of ticks. The other (2118), in whose gland smear rare Koch's blue bodies were discernible, was given 0·52 gramme of phenamidine per 100 lb. liveweight on 16.9.47. This animal weighed 179 lb.

The next morning the temperature had dropped from 102·6° C. to 98·4° C. Gland smears showed the presence of a few schizonts but no parasites were found in the blood. On 18.9.47, less than two days after phenamidine treatment, and three days after the first temperature rise, the animal died. The *post-mortem* examination revealed a gelatinous oedema in the kidneys with haemorrhages in the cortical areas, diffuse hyperaemia of the mucosa of the abomasum, and early pneumonic changes in the anterior lobes of the lungs accompanied by some oedema of the interstitial tissue. Slides from gland and spleen showed atypical schizonts which appeared as if they were undergoing some process of degeneration.

Bovines 2671 and 2470, weighing 300 lb., commenced to react on 17.9.47, 16 days after tick infestation. On 20.9.47, by which time fairly numerous, agamogenous schizonts in gland smears, and a few *T. parva* in blood smears had appeared, they were each given 0·6 gramme of phenamidine per 100 lb. liveweight. Both died on the second day after treatment, five days after the first temperature rise. *Post-mortem* findings were similar to those already described except that in the case of bovine 2470 there were petechiae in the caecum, the coronary fat and on the endocardium of the left ventricle.

Of the original 14 cattle, three were left untreated as controls and these died of East Coast fever in eight, ten and eleven days respectively after the first temperature elevation.

At about this time natural infection with East Coast fever occurred in a laboratory calf (3192). This animal was a six months' old grade steer weighing 140 lb. and it was first noticed to be obviously ill on 26.9.47. The temperature was 107° C., the superficial glands were enlarged and general debility was evident. Blood smears showed the presence of *T. parva* and in gland smears numerous Koch's blue bodies were seen: 0·71 gramme of phenamidine per 100 lb. liveweight was given the same day. Two days later this dose was repeated, but in the intervening interval the animal's condition had deteriorated. The temperature remained high and piroplasms and schizonts became increasingly frequent in smears. The disease progressed in a characteristic manner until death supervened on 3.10.47, seven days after treatment with phenamidine had commenced. The *post-mortem* examination revealed classical lesions of East Coast fever.

Table I summarises the results.

TABLE I

THE TREATMENT OF ANIMALS REACTING TO EAST COAST FEVER WITH 40 PER CENT. PHENAMIDINE

Bovine	Weight lb.	Febrile reaction commenced	Inoculation		Result
			Date	Dose per 100 lb.	
				gm.	
2629	250	15.9.47	15.9.47	2·4	Died 14 hours after inoculation, one day after first temperature rise.
2665	250	13.9.47	"	"	Died 14 hours after inoculation, three days after first temperature rise.
2675	260	"	"	2·3	Died 16 hours after inoculation, three days after first temperature rise.
H727	280	"	"	2·1	Died 14 hours after inoculation, three days after first temperature rise.
2433	280	15.9.47	"	"	Died 16 hours after inoculation, one day after first temperature rise.
2372	300	"	"	2·0	Died 18 hours after inoculation, one day after first temperature rise.
2118	179	16.9.47	16.9.47	0·52	Died 46 hours after inoculation, two days after first temperature rise.
2671	300	17.9.47	20.9.47	0·67	Died 48 hours after inoculation, five days after first temperature rise.
2470	300	"	"	"	Died 46 hours after inoculation, five days after first temperature rise.
3192	140	21.9.47	26.9.47	0·71	Died seven days after inoculation, 12 days after first temperature rise.
Controls					
1	280	15.9.47	—	—	Died eight days after first temperature rise.
2	250	16.9.47	—	—	Died ten days after first temperature rise.
3	295	17.9.47	—	—	Died eleven days after first temperature rise.

SUMMARY

Six out of 14 cattle infected with East Coast fever by tick infestation were given 2·0 to 2·4 grammes of phenamidine per 100 lb. liveweight in the very early stages of the disease. All died at intervals varying from 14 to 18 hours after inoculation (one to three days after the first temperature rise). Three other reacting animals which received respectively 0·52, 0·67 and 0·67 gramme of phenamidine per 100 lb. liveweight died two days later (two to five days after the first temperature rise). Three untreated control animals also died of East Coast fever but only after the usual pro-

tracted febrile reaction, deaths occurring eight, ten and eleven days respectively after the first temperature rise.

A six months' old calf which contracted East Coast fever naturally was given 0·71 gramme of phenamidine per 100 lb. bodyweight at a fairly advanced stage of the disease. No improvement occurred and the animal died seven days later.

(B) " QUINACRINE "

In 1947, " Quinacrine "* (C_{23} H_{30} ON_3 cl, 2Hcl, $2H_2O$; mepacrine hydrochloride) synthesised to replace Bayer's " Atebrin " was achieving excellent results in the treatment of human plasmodiosis. It was considered that an investigation was warranted to ascertain whether this drug might exert some influence on the development of *T. parva* in the bovine. Advantage was taken of an outbreak of East Coast fever amongst a herd of Zebu yearlings on one of the laboratory farms at Kabete. On 2.8.47, 14 animals weighing about 300 lb., which had been showing febrile reactions for three to five days, were placed in isolation at the laboratory. In all but one of them (3540) agamogenous schizonts were present in gland smears and most of them showed the presence of a few piroplasms in the blood stream. Blood and gland smears were examined daily from this date.

On 4.8.47, " Quinacrine " treatment was commenced and repeated daily for three days in seven of the animals, the remaining seven being left untreated as controls. Each dose consisted of 20 tablets, a total of 2·0 grammes " Quinacrine," ground up in a mortar and pestle and suspended in 20 c.c. of sterile water. Injections were given intramuscularly. The progress of the disease was judged by smear examination and is summarised in Table II (overleaf).

Discussion

Neither phenamidine nor " Quinacrine," as used in the manner described, had any beneficial effect in the treatment of East Coast fever. The rapid deaths following phenamidine treatment call for some comment. The dose of phenamidine for the bovine, as recommended by the manufacturers, is 0·6 gramme per 100 lb. liveweight. The first six animals to be treated received 2·0 to 2·4 grammes per 100 lb. liveweight, that is three to four times more than the recommended dose. These amounts were given in the absence of unfavourable reports of the use of similar doses in the field and on the presumption that larger doses of the drug would be more likely to affect the parasite of East Coast fever than smaller ones.

The treatment of bovine redwater and canine tick fever, due to *Babesia bigemina* and *Babesia canis* respectively, with phenamidine is rarely followed by unfavourable reactions and it is evident that the drug is well tolerated by these animals within the prescribed dosages. It is clear, however, from the results reported in this article that doses in excess of the recommended maximum may cause toxic symptoms and death. This would be readily acceptable were it not for the fact that over-dosing frequently has been employed on farms without untoward results.

Turning to the last three treated animals of the group, it will be observed that phenamidine was employed in correct dosages. Bovine 2118 received 0·52 gramme and bovines 2671 and 2470, 0·66 gramme per 100 lb. bodyweight. Yet these three animals also died within 48 hours of treatment, only three to five days after the first temperature rises. Since this was long before death would have occurred had the disease run its normal course, it seems that in these animals phenamidine in normal doses was also attended by unfavourable reactions.

As regards the experiments with " Quinacrine," there is little to be said other than that the drug completely failed to influence the development of either piroplasms or schizonts in any way. The dosage employed was fixed empirically at about 20 times that recommended for man.

* May & Baker, Ltd., Dagenham, England.

Conclusions

(1) The treatment of East Coast fever with (*a*) phenamidine and (*b*) " Quinacrine " is reported. Neither drug had any beneficial action on the course of the disease.

(2) Nine out of ten animals receiving phenamidine were treated in the very early stages of the disease when parasites were still comparatively uncommon in blood and gland smears. Six of these were given three to four times the normal dosage and died 14 to 18 hours later. The other three received normal doses and died within 48 hours of inoculation. These nine animals all died within two to five days of the first febrile reactions, whereas three untreated control animals suffered the usual protracted syndromes and died eight, ten and eleven days respectively after the first temperature elevations.

Acknowledgments.—I wish to express my indebtedness to Mr. A. J. Wiley, laboratory assistant, for assistance with much of the technical work, and to thank the Director of Veterinary Services for permission to publish this article.

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Continued on page 204 with Table II.

VITAMIN B_{12}

Two special University Lectures in Pharmacy were given by Dr. E. Lester Smith at the School of Pharmacy, 17, Bloomsbury Square, on February 7th and 8th; his subject was: " The Isolation, Properties and Functions of vitamin B_{12}."

In its report of these proceedings *The Pharmaceutical Journal* records that Dr. Lester Smith said that the isolation of vitamin B_{12} proved to be a converging point for several lines of research previously unconnected; its chemistry was remarkable: it was known to contain cobalt and cyanide in the molecule, and probably there were more surprises to come. Reminding his audience of the nature of pernicious anaemia, he pointed out that although the condition had been described by Addison a century ago, it remained incurable until 1926 when Minot and Murphy showed that dramatic improvement followed oral administration of large doses of liver. The next step was the production of Cohn's Fraction G which, given parenterally, was found to be 50 to 100 times more effective. Attempts were made to fractionate the pernicious anaemia factor of liver and in 1945 a concentrate was prepared which was active in a dose of 5 mg.; later an extract was made which was active in a dose of 1 mg. In 1948, Rickes and his colleagues reported the isolation of a red crystalline factor which they called vitamin B_{12} and almost simultaneously he (Dr. Lester Smith) and his colleagues obtained a red crystalline substance identical with the American one. Later, a most convenient source of vitamin B_{12} was found by fermentation of *Streptomyces griseus*.

Vitamin B_{12} was shown to be composed of a number of factors all closely related chemically and with the same microbiological and clinical activity. It appeared that vitamin $B_{12}a$ and $B_{12}b$ were substantially the same; vitamin $B_{12}c$ had a nitrite group in the molecule and vitamin $B_{12}d$ arose by removing the nitrite group. Vitamin $B_{12}d$ was shown to have properties similar to those of $B_{12}b$ but the two could be separated by chromatographic methods. Radioactive vitamin B_{12} had been produced by a method of fermentation in the presence of cobalt, resulting in a cobalt-labelled vitamin B_{12}; radiocarbon had recently been put in the molecule quite easily.

Dealing with the stability of vitamin B_{12}, Dr. Lester Smith said that the crystalline substance in the dry state was very stable and it could be heated to 100° C. without destruction. In solution its stability was slightly less: at *p*H 4 to 7 it could be autoclaved without much loss of activity; at *p*H 2 autoclaving caused considerable loss of activity; at *p*H 9 the loss was greater than at *p*H 2, while at *p*H 11 destruction was fairly rapid on boiling. Heavy metals and reducing agents were destructive; light had the effect of " stripping off " the cyanide group but on standing in the dark it recombined slowly. Vitamin B_{12} solution could be sterilised by filtration through a Seitz pad or by autoclaving; if a bactericide were required phenol could be added.

TABLE II

THE DEVELOPMENT OF PIROPLASMS AND SCHIZONTS OF *T. parva* IN (*a*) UNTREATED BOVINES, AND (*b*) BOVINES TREATED WITH "QUINACRINE"

(*a*) Untreated animals

Bovine	Slide	Days after febrile reaction commenced								
		4	5	6	7	8	9	10	11	12
3528	Blood P.	•	•	•	‡	‡	†	‡	§	
	Gland Ag.S.	†	†	‡	§	§	§	§	§	Died
	G.S.	—	•	†	†	†	‡	‡	§	
3532	Blood P.	†	†	‡	‡	‡	‡	‡	§	
	Gland Ag.S.	†	†	‡	§	§	§	§	§	Died
	G.S.	—	—	•	†	†	‡	‡	§	
3535	Blood P.	•	•	†	•	‡	§			
	Gland Ag.S.	†	†	‡	‡	‡	§	Died		
	G.S.	•	†	‡	‡	‡	§			
3536	Blood P.	—	•	‡	‡	‡	‡	§		
	Gland Ag.S.	†	†	‡	§	§	§	§	Died	
	G.S.	—	—	•	†	†	†	‡		
3539	Blood P.	•	†	‡	‡	‡	‡	§		
	Gland Ag.S.	†	†	‡	‡	‡	‡	§	Died	
	G.S.	—	•	†	†	†	†	‡		
3540	Blood P.	•	•	†	†	†	‡	‡	§	
	Gland Ag.S.	—	•	•	†	‡	‡	‡	§	Died
	G.S.	—	—	—	—	•	•	†	‡	
3593	Blood P.	•	†	‡	‡	‡	§			
	Gland Ag.S.	†	†	‡	‡	‡	§	Died		
	G.S.	—	•	†	†	†	§			

(*b*) Animals treated with "Quinacrine"

Bovine	Slide	Days before treatment commenced			Days after treatment commenced						
		2	1	0‖	1	2	3	4	5	6	7
3529	Blood P.	•	†	†	†	‡	‡	§			
	Gland Ag.S.	†	†	†	‡	‡	‡	‡	Died		
	G.S.	—	—	—	•	†	†	†			
3530	Blood P.	†	†	‡	•	‡	‡	‡	§	§	
	Gland Ag.S.	‡	‡	‡	‡	‡	‡	§	‡	§	Died
	G.S.	—	—	—	•	†	†	†			
3531	Blood P.	†	†	‡	•	‡	§				
	Gland Ag.S.	†	†	‡	§	§	§	Died			
	G.S.	—	—	•	†	†	‡				
3533	Blood P.	—	•	‡	•	‡	‡	‡			
	Gland Ag.S.	†	†	‡	‡	‡	‡	§	Died		
	G.S.	—	—	•	†	‡	‡	‡			
3538	Blood P.	—	•	†	†	‡	‡	‡			
	Gland Ag.S.	†	†	‡	‡	‡	‡	§	Died		
	G.S.	—	—	—	—	—	•	†			
3541	Blood P.	•	†	‡	‡	‡	‡	§	§	§	
	Gland Ag.S.	†	†	†	†	†	‡	§	§	§	Died
	G.S.	—	—	—	•	•	‡	†	§	§	
3592	Blood P.	—	•	•	•	‡	‡	§			
	Gland Ag.S.	•	†	‡	‡	‡	‡	‡	Died		
	G.S.	—	—	—	—	†	†	‡			

Note.—P. = Piroplasms. Ag.S. = Agamogenous schizonts. G.S. = Gamogenous schizonts. • = "Not common," † = "Common," ‡ = "Very common." § = "Teeming." ‖ = Treatment started, six days after febrile reaction commenced.

CLINICAL COMMUNICATIONS*

W. S. ALUN-JONES, M.R.C.V.S.,
DYSERTH, FLINTS

I. A Case of Basal Haemorrhage

This case concerned a three-year-old Welsh Mountain pony which was found fast in the branches of a bush with its head in a clump of gorse and bracken. The animal was released, taken to the farm and placed in a loose box. During the walk to the farm marked inco-ordination of the hind quarters was noted. The farmer was convinced that this was a case of acorn poisoning as there were oak trees in the fields.

When first seen the animal was down and could get to its feet only with difficulty; when it attained this position the pony moved slowly round to the right with a tendency to press its head into corners or anything which interrupted its circular movement. The temperature, pulse and respirations were normal at this stage, but the animal was in a semi-comatose condition, the pupils were dilated and would not respond to light. The tail was held over to the right and a rectal examination produced the most violent straining, whilst the walls of the rectum stuck to the hand as in the case of a twist of the bowel.

Visited two hours later, the animal was seen to be much worse. Movement to the right was more pronounced. When down there was an attempt to get into a sitting position with the front legs extended. Respirations were now accelerated with grunting, sweating and symptoms of colicy pain. Death occurred an hour or two later.

Post-mortem examination revealed the bowels to be normal with a full but not distended stomach; there was no evidence of acorns. To the naked eye every other organ and tissue appeared normal.

The skull was opened and the brain extracted with difficulty. This showed an area of haemorrhage, about ¾ inch long, at the junction of the pons Varolii and the medulla oblongata on the left side.

It is difficult to determine whether the haemorrhage resulted from the fall over the bush or was the cause of the fall. It may be presumed that the coma into which the animal fell was caused by oedema following upon the haemorrhage, and that the compression of the vital centres in the medulla by this oedema caused death.

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II. An Unusual Ending to a Case of Oesophageal Obstruction

The subject in this case was a third calf Friesian cow which was suffering from oesophageal obstruction with the typical symptoms of tympany, excessive salivation and coughing with depression. The obstruction could be felt in the lower third of the neck.

After some difficulty a probang was passed and the obstruction was soon felt. With gentle pressure the obstructed mass was moved down about 12 inches, but all further attempts to dislodge it met with no success. Owing to the extreme tympany the trocar was then used, and at the same time an injection of carbamylcholine was given.

Within half an hour the cow began to exhibit most violent symptoms, sweating profusely, with accelerated breathing and a marked grunt which became more pronounced until the animal died in about an hour.

Post-mortem examination revealed a large potato firmly wedged across the oesophagus within the chest cavity, but there was no damage to the oesophageal wall. Other organs appeared normal, with the exception of the heart. Here a piece of wire about 3 inches long was found transfixing the left auricle, with extensive haemorrhage into the pericardium.

Evidently the struggling and tympany had precipitated the penetration of the wire which must already have been in position, although the cow had not hitherto shown any acute symptoms suggestive of traumatic pericarditis.

. . . . .

III. An Unusual Case of Conjunctivitis

The subject was a vanner owned by an L.M.S. goods department and employed in light cartage.

This animal had been troubled for some time by an intermittent conjunctivitis of the left eye, but as far as is known, the right eye was not affected.

Preliminary examination revealed a severe conjunctivitis with profuse lachrymation. The eye was examined carefully and nothing was seen beyond the swollen and reddened conjunctivae. The surface of the cornea was beginning to be covered with the faint whiteness of an early opacity.

Eye drops containing a local anaesthetic were applied, with instructions for similar applications several times a day.

On seeing the animal again in the course of a couple of days, the eye was no better and another close examination was made. This time a small white thread-like object was seen lying on the surface of the cornea, which at the same time was seen to move.

The foreign body was removed on a swab soaked in normal saline and transferred to a small bottle containing this fluid.

Later examination under the microscope revealed this foreign body to be a nematode worm, in all about ¼ inch long and with the thickness of a fine piece of cotton.

The specimen was sent to Dr. E. L. Taylor, of Weybridge, for identification and proved to be *Thelaziella lacrymalis*. According to Dr. Taylor, this parasite has been recorded three times in this country. In his opinion, however, it may not be rare and the requisite care in its detection may, in fact, show it to be quite common. Apparently this nematode inhabits the lacrymal sac, but nothing is known about its life cycle.

After its removal the horse made an uneventful recovery.

[Within a week of reading this paper, the author met with a similar case of conjunctivitis in a young bovine. The parasite is now being identified.]

* Made to the annual general meeting of the North Wales Division, N.V.M.A., held at Denbigh, November 17th, 1950.

"SMITHFIELD A BOVINE VALHALLA"

"The difficulties of the trader and the discontent of the consumer have been seriously aggravated in London this week," states *The Meat Trades' Journal* in its issue of March 1st, and under the above heading. "In order to save the 8d. ration most depots on Smithfield have received large numbers of aged cows. When the hopelessness of cutting rations out of such meat was pointed out it was agreed there should be a certain amount of culling, but so uniformly poor was this residue from the dairy, the culled were indistinguishable from the rest. How proud would these animals have been could they have realised that after serving their country during the war they were to be raised to the dignity of providing rations for the victors five years after the war has finished."

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The Journal of Comparative Pathology and Therapeutics.—The Editors announce that the publication of this journal has been taken over by the University Press of Liverpool, and that subscriptions should accordingly be made to The University Press of Liverpool, 175, Brownlow Hill, Liverpool, 3, England. The price per volume of four numbers is £1 10s., payable in advance.

ABSTRACTS

[*Bacillus actinoides*: its Association with Pneumonia in Cattle and its Relationship to *Streptobacillus moniliformis*. Levi, M. L., *et al.* (1950.) *J. comp. Path.* **60.** 17.]

The authors report the isolation of *Bacillus actinoides* in 14 out of 26 bovine lungs showing the lesions of catarrhal bronchopneumonia. In two cases, adult animals were involved, the remainder being calves. The organism was recovered in pure culture in two cases only. In the other 12 cases it was associated with *C. pyogenes* or Pasteurella or both. Various other bacteria were isolated and *Dictyocaulus viviparus* was present in two specimens.

The evidence concerning the pathogenicity of *B. actinoides* is not conclusive. The authors were unable to infect small laboratory animals with it, but they produced the typical bronchopneumonia in one out of five goats by the injection of lung suspension. In this case, however, both *C. pyogenes* and Pasteurella were present in the original inoculum and all three organisms were recovered from the caprine lung when the animal died 15 days later. Transmission experiments to calves were not carried out.

In comparing their strains of *B. actinoides* with *Streptobacillus moniliformis* from mice and guinea-pigs, the authors find that the two organisms are distinct species to be placed in the same group.

I. W. J.

* * * * *

[A Dilution Method for the Milk Ring Test in Bovine Brucellosis Detection. Holm, G. C., Eveleth, D. E., & Rheault, P. L. (1950.) *Vet. Med.* **45.** 400–404.]

The milk ring test is performed by adding one drop of a thick haematoxylin-stained *Br. abortus* suspension to 1 c.c. of undiluted milk (or the milk under test may, if a titre is desired, be diluted with known negative milk). After shaking the sample is incubated for half to one hour at 37° C. In milks containing brucella antibodies the stained bacteria rise with the fat globules and are carried with these to the cream layer. Thus a strongly positive reaction is indicated by a blueish violet cream layer, distinctly separated, the milk column below being entirely white. In an entirely negative reaction the cream layer is white, and the milk column below, blueish violet. The test is valuable in quarter, composite and herd mlik samples. In Denmark the test is officially recognised as a method of testing herds for freedom from brucella infection.

Holm *et al.* describe two modifications to the test. Firstly, as a diluent they use formalin-treated negative milk with a high butterfat content, and, secondly, they centrifuge the tubes for ten minutes at 1,500 r.p.m. instead of incubating them. They confirm that the test can be applied as a routine test for brucellosis detection. They point out, however, that mastitis can cause false positives, but this is noted in herd milk, only when the herd is small, or the incidence of the mastitis is high. They also suggest that the milk ring test will detect developing infection earlier than the blood serum agglutination test and that naturally infected animals can be differentiated from vaccinated animals, but the evidence on which these statements are based is not very convincing.

J. S. P.

[Studies on the Effect of Streptomycin in Experimental Brucellosis in Guinea-pigs. Holm, L. W., & Moore, W. G. (1950.) *J. Amer. vet. Res.* **11.** 214.]

The authors record details of an experiment to study the effect of streptomycin and streptomycin with sulphadiazine on experimental brucellosis. Guinea-pigs weighing 400 to 500 grammes were infected by intraperitoneal injections of approximately 1,000,000 cells of a 24-hour tryptose broth culture of *Br. abortus*. The animals in groups of ten were treated as follows:—

I. Controls; infected; no treatment.
II. Treatment initiated at time of infection.
(*a*) One treatment per day.
Group (1) 10,000 units streptomycin.
Group (2) 120 mg. of sodium sulphadiazine per day.
Group (3) 10,000 units of streptomycin plus 120 mg. of sodium sulphadiazine.
(*b*) One treatment on alternate days.
Group (1) 20,000 units of streptomycin every other day.
Group (2) 240 mg. of sodium sulphadiazine every other day.
Group (3) 20,000 units streptomycin and 240 mg. sodium sulphadiazine every other day.
Group (4) 20,000 units of streptomycin and 120 mg. of sodium sulphadiazine every other day.
III. Treatment initiated ten days after infection.
(*a*) One treatment per day.
Groups 1, 2 and 3 same as in IIa.
(*b*) One treatment every other day.
Groups 1, 2, 3 and 4 same as in IIb.

The calcium chloride complex of streptomycin was administered subcutaneously in 0·5 ml. doses and the sodium salt of sulphadiazine as an oral dose of 0·5 ml.

Results were assessed on lesions and titres present after 21 days' treatment. On all schedules the combination of streptomycin and sulphadiazine proved to be markedly better than either alone. Treatment on alternate days produced as high a percentage of tissue sterilisations as that given every day. Results obtained with 20,000 units of streptomycin and 120 mg. sulphadiazine were as good as those obtained when 240 mg. of sulphadiazine alone was used.

The combination of streptomycin and sulphadiazine did not prove to be toxic to guinea-pigs.

J. Mack.

HANGING OF DOG

At St. Clears, Carmarthenshire, recently John Lewis, of Wembley Camp, St. Clears, was fined £3 for causing unnecessary suffering to a pedigree chow bitch. It was alleged that Lewis destroyed the animal by hanging it from a tree. The owner of the dog, Mrs. Florence May Davies, of Lonhafren, St. Clears, was fined £1 for permitting the offence. The Magistrates ordered the payment of £4 14s. costs and disqualified Lewis from holding a dog licence for five years.

* * * * *

On musing over the intimation that Michigan State College has a course of instruction for the wives of veterinarians, most British counterparts, intrigued into a sympathetic initial reaction to such a "good idea," will then wonder wistfully how the time is found and finally why it is deemed necessary to leave home for the purpose.

* * * * *

Waste from British fisheries which is now thrown overboard can be made into a good and palatable feeding-stuff for animals. Recent work at the Torry Research Station has proved that the material is capable of giving a yield and type of meal as good as that obtained from the usual fish offal.—*Meat Trades' Journal.*

REVIEWS

[**Elements of Animal Nutrition.** By W. M. Ashton. Published by Messrs. Charles Griffin & Co., Ltd., 42, Drury Lane, London, W.C.2 Price 20/-]

This concise text-book sets out to present the fundamentals of the theory and practice of stock feeding for undergraduate students of agricultural chemistry. It deals with the constitution of food constituents and their utilisation by the animal body. The foods commonly met with in farm practice are then discussed, special attention being paid to home-grown products, and methods of evaluating them are described, the starch equivalent system being dealt with in some detail. Next follows a general consideration of rationing and finally the food requirements of the various farm animals are considered and examples given of how to construct diets to meet various farm objectives. In a general survey of the text no errors of commission were noted though, as is inevitable in a book of this size, quite a number of important aspects receive scant attention. The only criticism which might be levelled at it is of the subject being treated at a somewhat elementary level. While doubtless of considerable value to the category of student for which it is primarily designed and while it may be of use as a handbook to farmers and stockbreeders, it is hardly comprehensive enough for the present-day veterinary student and is undoubtedly of very limited use to the veterinary surgeon in coping with the dietetic problems with which he is periodically confronted. For those, however, who wish to brush up their knowledge of the elements of the subject in a quick and pleasant manner, this eminently readable handbook can be recommended.

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[**Appointments in His Majesty's Colonial Service.** H. M. Stationery Office Publication.]

This publication is intended primarily for those resident elsewhere than in the Colonies and who wish to have further information about colonial appointments. It contains a great deal of useful information regarding the appointments themselves, the method of selection of candidates for those appointments, and the procedure after selection.

The section on the Colonial Veterinary Service has been written with sympathy and imagination, and indicates the freer life and the wider field of the colonial veterinary officer.

NATIONAL POULTRY SHOW SUSPENDED

Following a meeting of the National Poultry Show Committee in London, at which the fowl pest position was fully and frankly discussed, it was announced that the Committee, in support of the Ministry of Agriculture's campaign against fowl pest, had decided that the National poultry show be suspended for 1951.

The announcement continued: "Whilst expressing the utmost regret for its action, the Committee feels that the risk of spreading the 'low' form of the disease is such that despite the most stringent precautions, danger exists no matter where or in whatever circumstances stock is congregated.

"With the reputation it has established for the exhibition of healthy Standard stocks of British poultry, the National Show intends to support the efforts of the Ministry's Animal Health Division finally to stamp out the disease."

* * * * *

The achievement of Arran farmers in clearing their cattle herds from bovine tuberculosis was celebrated in Lamlash at a dinner attended by more than 300 persons. Tributes to the farmers' enthusiasm were paid by Mr. J. N. Ritchie, Deputy Chief Veterinary Officer in Scotland; Principal John Kirkwood, West of Scotland Agricultural College; and Mr. K. R. Whyte, Chief Regional Officer of the Scottish Milk Marketing Board.

QUESTIONS AND ANSWERS

The submission of questions for inclusion in this column will be welcomed; they can relate to any aspect of veterinary work. For purposes of record, each question is numbered, and those submitting questions are required to furnish (not for publication) name and address. It is regretted that consideration cannot be given to questions for which solely a private reply is required.

Answers to readers' queries represent exclusively the personal opinions of the writers, and criticism of the replies will be appreciated.

All communications should be addressed to the Editor.

Bull "Off His Feet"

Q. 381.—*What is the recommended treatment for a bull which has "gone off his feet"? I have in mind the condition which one frequently meets with in young bulls six to 12 months old which are being prepared for show purposes and are fed rather heavily without the corresponding daily exercise, the result being that there is a slight knuckling of the hind fetlocks and a resultant "tucking up" of the abdomen. Does the expert advocate exercise on soft ground in preference to exercising on hard ground* (e.g., *roadwork*) *in such cases?*

A.—The questioner to some extent answers his own question, in that he indicates that the condition is the result of over-feeding and lack of exercise. Therefore the obvious immediate course of action is to lessen the quantity of food consumed, preferably by reducing the carbohydrate part of the ration.

Regarding exercise, the main point is that the bull should get enough, and 20 to 30 minutes' walking per day would be sufficient. The character of the ground is not important, but hard is preferable to soft, since it makes for easier going and by allowing natural wear to occur would be of benefit to the feet.

Free exercise in a paddock would be ideal for such a young bull, but, if that is not possible, it would be advisable to keep him in a pen rather than a box or to tether him at pasture by day.

The condition might be the result of some defect in conformation, in which case exercise will tend to mask it, if it is slight, but will not correct it.

Laminitis is not uncommon in bulls being prepared for show and, if this is diagnosed, the appropriate treatment should be applied.

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Hormonal Termination of Oestrus (Bitch)

Q. 382.—*Is there any method of terminating oestrus in the bitch by hormone therapy?*

A.—The questioner does not state whether he refers only to normal oestrus or to the continued oestral symptoms associated with cystic ovaries and nymphomania.

Normal or unduly prolonged oestrus may be terminated by the administration of 100 to 200 I.U. of luteinising hormone. In these cases pro-oestrus persists owing to failure of Graafian follicles to mature, rupture and luteinise. Administration of L.H. promotes maturation and luteinisation, pro-oestrus passing in 48 to 72 hours into true oestrus, this phase lasting the usual five to seven days, after which the bitch passes into metoestrus normally.

Cases of nymphomania that have been in existence over a long period may prove incapable of ovulation owing to thickness of cyst walls, and therefore resistant to hormone therapy. Administration of corpus luteum tablets by mouth may cause the symptoms to abate temporarily, but such cases can be permanently cured only by ovariectomy.

N.B.—It is recommended by the makers that L.H. should be given intramuscularly rather than intravenously since cases of shock have been reported following its use by the latter route.

Dermatitis in Cats

Q. 383.—*A large number of cats are brought to the surgery suffering from dermatitis, causing exudations on the skin along the back and at the root of the tail. Sometimes no parasites are observed and occasionally a flea is seen. After some weeks the condition clears up, only to recur after several months. What is the best treatment?*

A.—This question would seem to refer to the so-called fish eczema of cats. It is generally seasonal in occurrence, being most prevalent in summer.

Cause.—It appears to be an allergic condition and is widely attributed to feeding cats on fish, but can occur on any diet. It is seen in nervous subjects and may be some form of neurosis.

Treatment.—Local application of calamine lotion. Antihistaminic drugs are indicated, the most effective being Phenergan administered in doses of 0·5 c.c. of 5 per cent. solution given by intramuscular injection for three successive days. Where infectious dermatitis has developed sulphanilamide should be administered orally. The cat should be fed on a varied diet—not fish alone.

It is of interest to note that a cure can be effected by removing the cat from its normal environment for two to three weeks—without any form of medication whatever.

All cases tend to recur.

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Correspondence

Prevention of Foot-rot in Cattle

Sir,—Last year after all the wet weather, some farms had 25 per cent. of their cattle infected with foot-rot, for which, it is claimed, the best treatment is a good pyaemic vaccine. For use in sheep I have had a vaccine made from *F. necrophorus* and I am now using it for cattle. At this moment, however, I cannot say which is the better because I found the pyaemic vaccine very efficacious.

A dose should be given as soon as the condition is noticed, and a little liniment should be rubbed on to the coronet, as that will prevent the foot from bursting. In some cases a second dose, given about a week after the first, is required, but one dose will clear up most of the cases.

Yours faithfully,

G. C. Lancaster.

Eastwick House,
Evesham,
Worcs.

February 26th, 1951.

POST-GRADUATE AGRICULTURAL SCHOLARSHIPS

The Ministry of Agriculture and Fisheries and the Department of Agriculture for Scotland propose to award, for the academic year beginning October 1st, 1951, or earlier, a limited number of post-graduate scholarships in Agricultural Economics, Husbandry, Statistics and Agricultural and Dairy Engineering.

The closing date for applications is May 1st, 1951, and further particulars can be obtained from the Secretary, Ministry of Agriculture and Fisheries (Research Branch), 1-4, Cambridge Terrace, Regent's Park, London, N.W.1, or the Secretary, Department of Agriculture for Scotland, St. Andrew's House, Edinburgh, 1. Applicants resident in Northern Ireland should apply to the Ministry of Agriculture and Fisheries at the above address.

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Renewal of Restrictions on the Keeping of Pigs, Hens and Rabbits.—The Ministry of Agriculture announces the revocation, in so far as England and Wales are concerned, of Defence (General) Regulation 62B, which suspends restrictions on the keeping of pigs, hens and rabbits. The Order will come into operation on July 1st, 1951, when Section 12 of the Allotments Act, 1950, which contains similar provisions in regard to hens and rabbits not kept commercially (but not pigs) will come into force.

QUESTIONS IN PARLIAMENT

Bull Licensing Standards (Scotland)

Miss Ward (March 6th) asked the Secretary of State for Scotland under what circumstances a licensing inspector recently turned down at Perth an Aberdeen Angus bull which had subsequently won the supreme championship and was sold at the record price of 8,500 guineas; what the qualifications of the inspector were; and how long he had been so employed.

Mr. McNeil: The bull was examined by one of my livestock inspectors who, applying standing instructions, recommended that a licence should not be granted because of a mouth deformity. The required licence was, however, granted before the bull was sold because in the opinion of the appeal referee (the owner having exercised his right to appeal) the deformity of the mouth was unlikely to be transmitted to the progeny of the bull. I am satisfied that the inspector is fully qualified to carry out his livestock duties. He was appointed to my permanent staff for these duties in 1948 and had many years' previous experience of livestock.

I should add that the Department of Agriculture for Scotland have arranged to discuss, during the next few weeks, the present licensing standards in Scotland in respect of mouth deformities and other defects in bulls with members of the veterinary profession, the breed societies and other agricultural interests.

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Ministries of Food and Agriculture

Mr. De la Bere (March 6th) asked the Prime Minister whether, in view of the increasing difficulties of co-ordination between the Ministry of Food and the Ministry of Agriculture, he will consider merging the two Departments to ensure smoother working and increased home food production.

The Prime Minister (Mr. Attlee): No, Sir. As I have informed the hon. Member on previous occasions, co-operation between the Ministry of Food and the Ministry of Agriculture and Fisheries is very close; and I am not aware of any difficulties to which he refers.

Mr. De la Bere: Is the Prime Minister aware that the actions of the Minister of Food and of the Ministry of Food are often diametrically opposed to the interests of what the Minister of Agriculture should be doing for the home producer, and could not the right hon. Gentleman put "No" in the reverse position and make it "on" so that we can get on to something worth while?

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Gambia Poultry Scheme

Mr. Nugent (March 5th) asked the Secretary of State for the Colonies when he expects to be able to make his intended statement about the reorganisation of the Gambia poultry scheme.

Mr. Cook: My right hon. Friend would prefer not to tie himself to a precise date. It is important that the Board of the Corporation should be allowed sufficient time to formulate considered proposals. They have assured me that they will lose no time in doing this, and for my part I shall naturally wish to make my further statement as soon as possible thereafter.

Sir H. Williams (March 7th) asked the Secretary of State for the Colonies if he will make a statement about the future of the Gambia poultry scheme in view of the very small production so far achieved.

Sir W. Smithers asked the Secretary of State for the Colonies if, in view of the cost involved and of the small results obtained, he will institute a review into the Gambia egg project.

Mr. Cook: As my right hon. Friend informed the House last Wednesday, he is awaiting fresh proposals from the Board of the Colonial Development Corporation on the future of the scheme. He will make a further statement when these have been received and considered.

Mr. Mott-Radclyffe asked the Secretary of State for the Colonies if he will state the quantity of feeding-stuffs hitherto imported into Gambia for consumption on the Gambia Poultry Farm.

Mr. Cook: Yes. My right hon. Friend thinks it will be useful for the House to have this information in anticipation of the proposed debate. The answer is that 2,394 tons have been imported.

[*Reference to the Opposition Motion on the Gambia Poultry Scheme, which was debated in the House on Tuesday last, is made in our Notes and News columns.*—Editor.]

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Poultry Feeding-stuffs

Brigadier Medlicott (March 5th) asked the Minister of Agriculture if he is now able to relax the restrictions on the allocation of feeding-stuffs for those wishing to set up poultry farms.

Mr. T. WILLIAMS: I regret that I am not at present in a position to increase or extend the rations for poultry.

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HORSES (TRANSPORT)

Squadron Leader BURDEN (March 8th) asked the Minister of Agriculture if he will now say whether he will make an order under the Diseases of Animals Acts for the better protection of horses during transit to and in this country.

Brigadier MEDLICOTT asked the Minister of Agriculture how soon he anticipates making an order under the Diseases of Animals Act for the better protection of horses during transit to this country.

Mr. T. WILLIAMS: The transport of horses within Great Britain has already been dealt with under the Transit of Horses Order, 1951, which comes into operation on March 19th. [See Notes and News columns of this issue.—*Editor.*] I propose also to make an order for the better protection of horses during transit to this country. A good deal of consideration needs to be given to the detailed provisions of the order and consultation with interests concerned will also be necessary. Therefore, although my Department will press ahead as quickly as possible, I am afraid it will inevitably be a few weeks before the order can be made.

Sir J. LUCAS asked the Minister of Agriculture whether in view of recent cases of cruelty to horses in transit, he will now take powers to enable him to prosecute any employer who knowingly employs a man, twice convicted of cruelty, in any capacity where there is a possibility of a similar offence again being committed.

Mr. T. WILLIAMS: No. It would not be appropriate to single out this particular type of case for special legislation. The law in relation to the transit of horses by road is being strengthened by the Transit of Horses Order, 1951.

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DOGS (HARD PAD)

Mr. WAKEFIELD (March 8th) asked the Minister of Agriculture whether he can give figures of the mortality among dogs caused by hard pad during the last three years; what steps have been taken to control or eradicate this disease; and if he will make a statement.

Mr. T. WILLIAMS: I am advised that it is often difficult to distinguish between true distemper and so-called hard pad disease. I have no particulars about the incidence of or mortality caused by hard pad. Research into hard pad disease is continuing and a serum of some protective and curative value is available to veterinary surgeons.

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SCOTLAND (REINDEER BREEDING)

Mr. F. MACLEAN (March 8th) asked the Secretary of State for Scotland if he will make a statement regarding the proposed scheme for breeding reindeer in this country.

Mr. MCNEIL: I have informed the Reindeer Council of the United Kingdom through the Scottish Council (Development and Industry) that the Government are prepared, as an exceptional arrangement in view of the possible advantage to the Scottish economy, to authorise the import of 25 reindeer from Sweden so that an experiment to determine whether they can be usefully and successfully reared on a suitable site in the Highlands and Islands may be carried out. The experiment would be subject to strict conditions which have been suggested by the Nature Conservancy and to animal health safeguards. The Reindeer Council have not yet informed me whether they are prepared to accept these conditions.

HIGHER MILK STANDARD QUALIFICATION FOR DAIRY SHORTHORN YEAR BOOK

A new minimum standard milk yield has been fixed by the Council of the Shorthorn Society as a requirement for publication in the Dairy Shorthorn Year Book. The new standards, which come into effect with lactations commencing on and after October 1st, 1951, are as follows: After calving at three years of age or under, at least 6,000 lb.; after calving at over three years and under four years, at least 7,000 lb.; after calving at four years or over, at least 8,000 lb. This is an increase of 500 lb. in the case of the two younger age groups.

The Council of the Society also has decided that, on and after October 1st, 1952, milk yields shall be accepted for publication in the Dairy Shorthorn Year Book only if accompanied by a lactation period butterfat percentage.

NOTES AND NEWS

Diary of Events

Mar. 21st.—Meeting of the West of Scotland Division, N.V.M.A., Clinical Club, in the Glasgow Veterinary School, 7.30 p.m.

Mar. 21st.—Laboratory Meeting of the Section of Comparative Medicine, Royal Society of Medicine, at the Chester Beatty Research Institute, Royal Cancer Hospital, Fulham Road, S.W.3, 4 p.m.

Mar. 22nd.—Annual General Meeting of the Western Counties Division, N.V.M.A., at Exeter (Imperial Hotel), 2.30 p.m. Assemble for luncheon, 12.45 p.m.

Mar. 28th.—Meeting of the West of Scotland Division, N.V.M.A., in the Glasgow Veterinary School, 2.30 p.m.

Apr. 5th.—Meeting of the Lincolnshire and District Division, N.V.M.A., at Grantham (George Hotel), 2.15 p.m.

Apr. 9th and 10th.—Annual Congress of the Laboratory Animals Bureau, in the University of Liverpool.

Sept. 23rd-29th.—Sixty-ninth Annual General Meeting and Congress of the National Veterinary Medical Association, at Eastbourne.

R.C.V.S. EXAMINATIONS

Wednesday, May 2nd.—Animal Management Examination commences at London.

Thursday, May 10th.—Entries for D.V.S.M. Examination due.

Tuesday, May 15th.—Pharmacology, etc., Examination (Revised Syllabus). Written Examination.

Thursday, May 17th.—Pharmacology, etc., Examination (Revised Syllabus). Orals and Practicals (London and Dublin).

Thursday, June 7th.—D.V.S.M. Written Examinations commence at Edinburgh.

Monday, June 11th.—D.V.S.M. Oral Examinations commence.

Thursday, June 21st.—M.R.C.V.S. Written Examinations.

Friday, June 22nd.—M.R.C.V.S. Written Examinations.

QUARTERLY MEETINGS OF COUNCIL AND STANDING COMMITTEES N.V.M.A. DURING 1951

The following dates are given for remaining meetings this year, chiefly to give members plenty of time to reserve hotel accommodation.

IN LONDON

Monday, April 16th:
2 p.m. Organising Committee
4 p.m. Parliamentary and Public Relations Committee.

Tuesday, April 17th:
10 a.m. Veterinary State Medicine Committee.
12 noon Home Appointments Committee.
2.15 p.m. General Purposes and Finance Committee.

Wednesday, April 18th:
11 a.m. Council

IN EDINBURGH

Wednesday, July 11th:
11 a.m. Home Appointments Committee.
2 p.m. Organising Committee.
4 p.m. Parliamentary and Public Relations Committee.

Thursday, July 12th:
11 a.m. Veterinary State Medicine Committee.
2 p.m. General Purposes and Finance Committee.

Friday, July 13th:
11 a.m. Council.

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Members Proceeding to Australia—N.V.M.A. Letters of Introduction

It has been suggested by the Council of the Australian Veterinary Association that any member of the N.V.M.A. who may emigrate to Australia should be furnished by the Association with a letter of introduction to the appropriate Divisional Secretary of the Australian Veterinary Association, or with a general letter introducing him to the members of the profession in that country.

Any member of the N.V.M.A. taking up a post in Australia and who wishes to take advantage of this suggestion, should communicate with the General Secretary, N.V.M.A., 36, Gordon Square, W.C.1.

PERSONAL

Death.—KING.—On March 10th, 1951, suddenly, Mary, beloved wife of Nevill King, of Whyteleaf, Leatherhead.

Their many friends in the profession will learn of the death of Mrs. King with the deepest regret and will wish us, in their name, to extend sincere sympathy to Mr. Nevill King, M.R.C.V.S., whose wife was the daughter of the late Mr. H. Roberts, M.R.C.V.S., of the same address. It is requested that, in lieu of flowers, donations should be sent to the Victoria Veterinary Benevolent Fund, 10, Red Lion Square, W.C.1.

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Marriages.—O'CONNOR—CRILLY.—On January 10th, 1951, at St. Colmcilles Church, Swords, Co. Dublin, J. Desmond O'Connor, M.R.C.V.S., son of Professor and Mrs. J. J. O'Connor, Dublin, to Angela Frances Crilly, daughter of Mr. and Mrs. John Crilly, "Cremona," Swords, Co. Dublin.

PAY—MASTERS.—On February 24th, 1951, at St. Barnabas Church, Temple Fortune, London, N.W.11, Thomas William Ferran Pay, B.SC., M.R.C.V.S., only son of Mr. and Mrs. T. W. Pay, of South Mimms, Middlesex, to Patricia Mary, only daughter of Mr. and Mrs. T. Masters, of Barnet, Herts.

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Forthcoming Marriage.—PRICE—COWES.—The engagement is announced between Eric Kelvin Price, M.R.C.V.S., only son of Mr. and Mrs. G. Price, of Ystalyfera, Glamorgan, and Sheila Mary Cowes, only daughter of Mrs. E. Cowes and the late Mr. D. Cowes, of Steyning, Sussex.

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Richmond Horse Show Director.—Mr. T. A. Dobie, M.R.C.V.S., who since 1947 has acted as chairman of the veterinary surgeons at Richmond Royal Horse Show, has been appointed a director of the Society. Before going to Richmond, Mr. Dobie was in practice on Merseyside, and he was closely associated with the Wirral and Birkenhead Agricultural Society, of which his father, who died recently, had been for a period Chairman. When this Society was dissolved, Mr. Dobie continued his association with the Cheshire Association until he came south.

At the meeting at which Mr. Dobie's appointment was made, it was reported that the prospects for the success of this year's show, to be held on June 7th, 8th and 9th, were excellent.

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The Parliamentary Secretary to the Ministry of Agriculture and Fisheries has appointed Mr. E. D. Hardy to be his Private Secretary.

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Will.—ANGLER, Captain Engelbert Furt, of 33, Hallgate, Doncaster, veterinary surgeon and former racehorse owner, £9,161.

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Protection of Horses During Transit

ORDER RELATING TO TRANSPORT WITHIN GREAT BRITAIN

The Minister of Agriculture has made an Order (The Transit of Horses Order, 1951) under Section 20 of the Diseases of Animals Act, 1950, with the object of providing protection for horses under transit in Great Britain: the new Order comes into operation on March 19th. The Minister also has intimated (see our Parliamentary columns) that as soon as possible a further Order will be made for the better protection of horses during transit to this country, which has been pressed for vigorously in the House of Commons since the disclosure of the losses incurred in the importation of horses from Ireland (*Vet. Rec.* **63**, 170).

Part I of the Order (Statutory Instrument No. 335: H.M.S.O., 6d.) deals with the construction of trucks, etc., intended to be used for the carriage of horses, and provides for spring buffers and a suitable foothold (applying also to loading doors and gangways). Requirements are laid down for the carriage of mixed consignments, the avoidance of overcrowding and the provision of (and timing of access to) adequate water supplies and fodder during transit and at stations, the protection of the animals from inclement weather, and facilities for loading and unloading. In addition, "all reasonable facilities shall be afforded to an Inspector to enable him to examine any horse at its destination on the railway both before and after the horse has been unloaded."

Part II relates to the protection of horses during carriage by road and covers the foregoing aspects in like manner, while Part III prohibits the transit of unfit animals, except by ambulance, and adds (para 16): "Where an Inspector is of the opinion that a horse intended to be carried by rail or in any road vehicle cannot, owing to infirmity, illness, injury, fatigue or any other cause, be so carried without unnecessary suffering, he may serve a Notice to that effect on the person in charge of the horse and thereupon until such Notice is withdrawn by an Inspector it shall not be lawful to carry the horse by rail or in a road vehicle otherwise than with the written authorisation of an Inspector, and then only in accordance with such conditions (if any) as may be specified in the authorisation."

In Part IV provision is made for the adequate disinfection of vehicles "and other things used for or in connection with the carriage of horses," the disposal of litter and the keeping of records of horses carried, on forms supplied by a local authority.

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Gambia Poultry Scheme

GOVERNMENT MAJORITY OF EIGHT

On Friday of last week the Opposition in the House of Commons tabled the following motion, which stood in the names of Mr. Churchill, Mr. Eden, Mr. R. A. Butler, Mr. R. S. Hudson, Captain Crookshank, and Mr. Lennox-Boyd:—

"That this House regrets the financial losses caused by the collapse of the Gambia Poultry Scheme, which had been launched without adequate consultation or any preliminary pilot scheme to discover whether the poultry could be kept in healthy production or the necessary feeding-stuffs grown in the colony."

After a brief but spirited debate, an account of which will be given in our next issue, the House negatived the motion (submitted by Mr. Lennox-Boyd) by 299 votes to 291.

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FOWL PEST

The Ministry of Agriculture has decided to withdraw the restrictions on the movement of live poultry from East Anglia and on the movement of live poultry into Cumberland, Durham, Northumberland and Westmorland and the Furness district of Lancashire from the remainder of England and from Wales. Since this decision involves the making of a new Order, the opportunity has been taken to consolidate the existing regulations in the new Order. This Order, entitled the Live Poultry (Restrictions) Order, 1951, came into operation on March 12th, 1951.

The Order prohibits the holding of poultry shows and of sales of store poultry, the movement of poultry out of five areas around London, Birmingham, Liverpool, Cardiff and Bristol and the movement of poultry, day-old chicks and hatching eggs from England and Wales into Scotland. It also restricts the movement of poultry and the operations of poultry dealers and regulates the holding of markets of poultry for immediate slaughter.

Copies of the Order can be obtained from the Ministry of Agriculture and Fisheries, Hook Rise, Tolworth, Surbiton, Surrey, or from H.M. Stationery Office.

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REINDEER FOR SCOTLAND

PERMISSION FOR IMPORT GRANTED

The Government have informed the Reindeer Council of the United Kingdom that they are prepared to allow the import to Scotland from Sweden of 25 reindeer, subject to strict conditions, to determine whether they can be successfully reared in the Highlands and islands.

Sir Frederick Whyte, the Chairman of the Council, opening an exhibition of reindeer products at 14, Ladbroke Square, W.11—the home of Mr. and Mrs. Hillar Kallas—said (reports *The Times*) that discussions are shortly to take place between the Secretary of State for Scotland and representatives of the Reindeer Council.

Mr. Kallas said that it was hoped to bring the 25 reindeer from northern Sweden to Scotland, where the conditions are favourable for such an experiment, by June. In three years the number would naturally increase to 75 and if the experiment were successful it was intended to import thousands of animals. The undertaking at this stage, he said, was not commercial but purely scientific. There was not a part of the reindeer that could not be put to commercial use.

The exhibits include rugs, winter coats and boots, fur mittens, carved knife sheaths, decorative buttons, and paper knives. Those attending the opening ceremony were regaled with samples of roast reindeer meat and mulled wine.

[A written reply by the Secretary of State for Scotland to a question on this subject is given in our Parliamentary columns.—*Editor.*]

KNACKER TYPES FOR RATION?

In its issue of March 8th, the *Meat Trades Journal*, under the above heading, reports that several Scunthorpe (Lincs) Town Councillors expressed their concern at a letter the authority had received from the Birmingham office of the Ministry of Food in reply to complaints about the number of graded cattle found, on examination at the slaughterhouses, to be affected with disease. The letter explained the reason for the increase in diseased meat and pointed out that the position in Scunthorpe was no worse, and in fact was considerably better, than the average for the whole of the Midland area. The letter then went on:—

"Under the system of control of meat and livestock, and in order to secure as much meat as possible to fill the ration, large numbers of cattle which, in the past, found their way to the knacker yards, are now sold to the Ministry and come into the Ministry's slaughterhouses."

It was this paragraph which brought forth criticism from the councillors.

Councillor E. V. Abraham said it was high time something drastic was done to have the state of affairs altered. "The Ministry of Food should take note of this and separate the cattle so that animals which are fit only for the glue pot should not be put through for the stew pot," he said.

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MANAGEMENT FACTOR IN THE CONTROL OF MASTITIS

Herd management in relation to mastitis was under discussion at the annual spring conference, held recently in London, of the British Society of Animal Production. In its report of the proceedings *The Farmers' Weekly* states that the opening papers stressed that the main plank in the farmer's fight against chronic mastitis, due to *Streptococcus agalactiae*, was cowshed hygiene.

Mr. George N. Gould, M.R.C.V.S., of Southampton, speaking of the disease from the veterinary point of view, said that the root of the problem was management, even with penicillin treatment. Management was inevitably a question of personnel and the training of that personnel. To-day, there were very few people who could milk a cow efficiently by hand. The handling of the cow's teat was a most important factor and in machine milking the elimination of hand stripping was not only practicable, but was the main solution of the difficulty of avoiding infection.

The proper use of the machine could be organised; in his part of the country they came to the conclusion that one man could not be expected to control more than two milking units efficiently.

For the perfect result one would have to go in for eradication on a herd basis, but the trouble here was that when one used penicillin extensively an entirely different clinical picture began to present itself. One found the cases to which one was called more acute. This winter, in particular, he had had a very high incidence of such cases—the cow could be perfectly all right when she was milked and in a very few hours she could be very ill. "The clinical mastitis problem to-day is changing and the rapidity of the change is dependent on the way penicillin has been used and how extensively." In his area they had been using penicillin for drying off for several years now, but last year they had a higher incidence of "summer mastitis" than ever before.

One should warn against the tendency of many farmers to think that penicillin was the be-all and end-all of the mastitis problem: penicillin was a phase of the treatment. The time had come for more research into the development of resistant strains and how they could be avoided.

In the discussion a question posed to the meeting was whether the use of the strip cup was an aid or a menace in cow-shed hygiene. Mr. Gould said that if one had good management in the cowshed one could use the strip cup with safety provided one had a low incidence of streptococcal mastitis. But without good management it was a menace and one would spread infection by its use.

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ADDRESSES OF DISEASE-INFECTED PREMISES

The list given below indicates, first, the country in which are situated the premises on which disease has been confirmed, followed by the postal address and date of outbreak.

SWINE FEVER:

Derby.—Highfield House, 49, Cross London Street, New Whittington, Chesterfield (Mar. 8th).

Kent.—2, Crosshall Cottages, Chelsfield (disease at: Bellropes, Chelsfield, Farnborough) (Mar. 8th).

Norfolk.—Old Rectory, North Baringham, Norwich (Mar. 5th); Rose Lodge Farm, Old Catton, Norwich (Mar. 6th).

Notts.—"Mandalay," Bawtry Road, Blythe, Worksop (Mar. 5th); Wolf Farm, Gaythorpe, Nottingham (Mar. 8th).

Perthshire.—West Tofts, Stanley, Perth (Mar. 10th).

Renfrew.—Hawkhead Piggery, Hawkhead Road, Paisley (Mar. 8th).

Yorks (E.R.).—White House Farm, Ryehill, Thorngumbald, Hull (Mar. 5th); East Farm, Ulrome, Driffield (Mar. 10th).

Yorks (W.R.).—38, Hartley Street, Mexborough (disease at: Brickyard Allotments, Mexborough); 20, Lower Brow Road, Paddock, Huddersfield; 216, Haighmore Road, West Ardale, Barnsley (Mar. 6th); Thorpe House Farm, Thorpe, Wakefield (Mar. 8th); Main Street, Garforth (disease at: Strawberry Avenue Piggery, Garforth (Mar. 9th).

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ANTHRAX IN LANARKSHIRE

"An outbreak of anthrax among cattle on farms in different parts of Lanarkshire has been confirmed by the Divisional Veterinary Officer of the Ministry of Agriculture at Hamilton," states the *Glasgow Herald* in its issue of March 5th and continues: "Eight cows are reported to have died on farms in Chapelton, Coalburn, and Biggar. Mr. R. M. M'Kay Davidson, Divisional Veterinary Officer of the Ministry's Animal Health Division, said he did not anticipate a large outbreak.

"The outbreak follows close on that reported from Calderpark Zoo, where 12 animals died from the disease. Infected animal feeding-stuffs imported from abroad are believed to be the source of infection. Veterinary officers attached to the Hamilton office of the Ministry of Agriculture are checking up on all deaths of animals at farms in Lanarkshire and are making blood tests from the carcases."

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U.S.A. ANIMAL CARE PANEL

In its February issue *The North American Veterinarian* reports that the first meeting of a new national organisation, known as the Animal Care Panel, was held in Chicago on November 28th, 1950. Representatives were present from veterinary and medical research institutions throughout the country, and from commercial organisations interested in problems of animal care on an institutional scale. The purpose of the Panel is to find solutions for the problems of providing adequate care and facilities for laboratory animals in research institutions.

The importance of veterinary supervision of animal facilities, and the need for centralisation of animal quarters and for standardisation of equipment were stressed at this first meeting. Problems of disease control, antivivisectionist control problems, and management procedures also were considered.

Veterinarians participating in the programme were: Dr. W. T. S. Thorp, National Institutes of Health, Bethesda, Maryland; Dr. C. F. Schlotthauer, Mayo Foundation, Rochester, Minnesota; Dr. N. R. Brewer, University of Chicago, Chicago, Illinois, and others. Dr. Thorp described the plans for the new animal colony buildings in Bethesda. "We will not have floor drains in the buildings since floor drains may serve as a source of infection and be a likely possibility for sending all refuse out of the room that way."

Dr. Schlotthauer discussed problems in the procurement and use of animals for research. People, in thinking about research with animals, may be divided into three groups. The extreme right consists of people who feel animals have no rights, and investigators should do what they want with them. On the extreme left are people who oppose all research with animals. The thinking people, in the middle, about 90 per cent. of the total, favour needed research with animals. Medical and veterinary research institutions must be able to explain, to these thinking people, procedures which are necessary in research, in order to gain their active support, and in order to overcome opposition from the extreme left.

Dr. N. R. Brewer presented a paper on "Dog Cages for the Research Laboratory." The ideal dog cage is one so constructed that to the dog it is roomy, dry and comfortable; to the animal caretaker it is easy to clean, and caring for the dog in it is not made too difficult; to the board of directors it is a cage having a low original cost, low depreciation, and taking up a small amount of space; and to the investigator it is a cage that can act as a storage cage, a metabolism cage, and a convalescent cage, sometimes all at the same time. The cages used in many animal hospitals are satisfactory convalescent cages.

Zoonoses

"Diseases transmitted from vertebrate animals to man are more numerous than those of us who keep dogs, cats or horses like to think; while even bird and fish lovers, shepherds, cowhands, rat catchers, and those who keep a bandicoot-opossum, run their risks," observes *The Lancet*, commenting in an annotation in its issue of March 3rd on the review issued by the W.H.O./F.A.O. Expert Group on Zoonoses.[1] "In a list of more than 80 such diseases drawn up last December the horse was incriminated in 14 instances, the cat in 22, and the dog in 39. Dog-borne diseases are mainly worm infestations, and most of them are rare in this country; but hydatid disease, to which the group devote a section, is not unknown here; a few years ago Wolfe[2] reported 34 cases treated in Cardiff between 1926 and 1938. The disease is common in South America and in the Mediterranean littoral, and is also found in parts of Central Europe and the Middle East. The group point out that it is spreading from major foci of infection and that new foci have been found in regions hitherto thought to be free. They advise that campaigns against it should ensure that stray dogs are killed and that other dogs are brought for adequate anthelminthic treatment with arecoline hydrobromide. Reinfection of dogs is best avoided by improving practice in slaughterhouses (where they are apt to pick up infected offal) and spread to man by educating the public, especially schoolchildren, in the dangers of contamination. A long section deals with the control of tuberculosis in cattle. The danger of infection by direct contact between tuberculous cattle and farm workers and their families is noted; children particularly are liable to acquire the disease by droplet infection in barns. The group estimate that the 'productive efficiency' of cows infected with tuberculosis may be reduced by 10 to 25 per cent. Adult cows are largely responsible for spread of the disease; but since 'the cow population of a country or of a herd changes completely or almost completely every six years,' and the elderly cows are the first to leave the herd, it is only necessary to guard the young cows from infection to reduce the disease drastically in a few years. In an area where there is little infection it soon becomes possible to build up an infection-free area, which stimulates farmers in neighbouring districts and provides a supply of healthy animals to replace reacting cattle in more heavily infected places. A bonus for milk from tuberculosis-free herds, and later a reduction in price for milk from diseased herds, has also proved effective. In the United States, after the Federal control programme was initiated in 1917, all cattle reacting to tuberculin were slaughtered; but this highly effective measure is only possible in a wealthy country. Immunisation of cattle with B.C.G. and vole bacillus is recommended as a temporary expedient to reduce spread before the development of an eradication scheme.

"Q fever, now recognised as an important public health problem, is thought to be mainly an airborne infection from domestic animals, but can be transmitted by infected milk.[3] As yet the group have little to suggest in the way of control measures, except the adequate heating of milk; but they note that preliminary studies suggest that immunisation of animals may be effective. Meanwhile we should study the epidemiology of the infection. Anthrax continues to present its problems despite the success of penicillin in the treatment of the cutaneous form. There is no satisfactory method (from an economic point of view) of disinfecting hides, skins or the effluent from factories. But the British method of disinfecting hair and wool, details of which are given in an appendix, is effective for small imports. Scouring of the new wool reduces the risk, and dyeing puts an end to it; so the group recommend dyeing of the raw stock whenever possible.

"Parrots have lost the distinction of providing an eponym since it was discovered that most birds can spread the infection formerly called psittacosis, now ornithosis. The recognition of larger reservoirs has been accompanied by an unexplained drop in the incidence of human cases; and those who had planned national quarantine policies have rather lost heart. The group recommend that while commercial shipments of psittacine birds should be banned, individuals might be given permission to import pets, rare birds and exceptional breeding stock. So the sailor may bring back a parrot as of yore."

[1] World Health Organisation, 1951. W.H.O./Zoon/15 Rev. 1. Pp. 31, with appendices pp. xiv.
[2] Wolfe, H. R. I. *Lancet*, 1934, *i*, 795.
[3] *Lancet*, 1950, *ii*, 630.

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By the end of April, 136,000,000 eggs will be oil-dipped for preservation in cold store. This is the result of a successful pilot scheme carried out by the Ministry of Food at six centres (three in England, one in Scotland and two in Northern Ireland) in 1949.

DEVELOPING AFRICAN PROTECTORATES

Soil Erosion Problem

The Secretary of State for Commonwealth Relations has described his recent tour in Africa to Press correspondents in London. Mr. Gordon-Walker spent about six weeks in Southern Rhodesia, the Union of South Africa, and the three High Commission territories—Basutoland, Bechuanaland, and Swaziland. As Under-Secretary or Secretary of State he has now visited all the capitals of the Commonwealth.

Mr. Gordon-Walker said that, in general, soil erosion was by far the biggest problem that Africa had to face. In the High Commission territories, where the problem was grave, he was pleased with the anti-erosion work of our officers and the good co-operation in the work between the natives and our administration.

The Minister also expressed his satisfaction with the long-term economic development in the three territories, mainly under the Commonwealth Development and Welfare Fund, through which we were spending about £1,000,000 in each territory on schemes designed to raise their basic wealth. The Colonial Development Corporation was doing excellent work in cattle-raising and planting timber, which would be a prosperous activity 12 or 15 years from now. Private enterprise also was doing very good work in the three territories, fitting in well with the public undertakings.

CORRESPONDENCE

The views expressed in letters addressed to the Editor represent the personal opinions of the writer only and their publication does not imply endorsement by the N.V.M.A.

ACETONAEMIA IN CATTLE

Sir,—Setting his biochemical reasoning to one side for the moment, Mr. Cassells seems to have answered his own question as to whether acetonaemia should be regarded as "a clinical subject or as an exercise for the imagination of the biochemist." The condition, as he says, is a disturbance in cell metabolism and therefore a fit and proper subject for biochemical treatment.

Acetonaemia in its broadest sense is unquestionably of multiple aetiology, but the discussion has centred mainly around what Professor Carlström terms "primary" or "puerperal" acetonaemia, the characteristics of which are sufficiently distinct to allow the condition to be regarded as a clinical entity. It is the biochemical origin of this particular condition that many workers are attempting to elucidate, Mr. Cassells surely will not deny that it is preferable to know the exact aetiology of a disease rather than to have to rely on treatment of symptoms?

A more generally accepted account of the processes involved in the oxidation of glucose can be found in any modern text-book of biochemistry—Mr. Cassells has obviously confused β-hydroxybutyric with lactic acid (α-hydroxypropionic), production of which is a feature of anaerobic rather than aerobic breakdown of carbohydrate.

Yours faithfully,

R. J. Garner.
The University of Liverpool,
Biochemistry Department,
Johnston Laboratories,
March 1st, 1951.

* * * * *

STATE CONTROL OF MASTITIS

Sir,—The Ministry, we are informed, have developed a technique for the examination of milk samples for the presence of *Str. agalactiae*. They have such confidence in this technique that they are prepared to cover up to 10 per cent. of the herds in a county. This being the case, I suggest that they should throw open their diagnostic service to the farming community on a "first come first served" basis, provided that the Ministry are also prepared to advise the farmer, or rather his veterinary surgeon, as to the best method of control or eradication. As this scheme proceeded the Ministry would soon be able to determine the true incidence of *Str. agalactiae* and other infections throughout the country.

If, however, the Ministry are not yet prepared to advise as to the best method of control or eradication I would respectfully suggest that they continue to experiment on a small scale until they have achieved this object. The incidence of *Str. agalactiae* and other infections is, I submit, merely of theoretical interest unless and until one has perfected a technique of dealing with it.

In these days of reasonably ready access by the farmer to supplies of penicillin through his veterinary surgeon I feel that free issues

of large quantities is a gross and unnecessary expenditure of public funds.

Mr. L. Pitcher says the "free" bogey is worn out. I disagree with him but I do know that the tax-payer is almost worn out.

Yours faithfully,

Orchard House, J. P. Pickering.
Priestpopple,
Hexham,
Northumberland.

. . . . . .

Sir,—I am pleased to read in this week's *Record* that at last someone has had the foresight and the courage to put in print what many members feel about the recent "survey tests" on mastitis conducted by the Ministry of Agriculture.

I am a northerner and, like most of those not *immediately* affected by the tests, I was not particularly alarmed or worried when I read of the introduction of the "survey." Having recently been working in the south, however, it was brought home to me just how serious the position will be if the scheme is allowed to grow and engulf wider areas.

My personal objections to the "survey" are as follows:

(*a*) Its rapid and extensive growth is not conducive to efficiency.

(*b*) It has appealed to that streak in human nature which says "Get what you can—it costs nothing," the consequence being that the farming community, quite understandably, regard it as a means of reducing their veterinary surgeon's accounts.

(c) It has cut out a certain amount of valuable contact between the farmer and his veterinary surgeon.

It would have been better, in my opinion, if, after consultation with the local practitioners, the Ministry had selected a few herds in which the owner would have agreed to pay the proper price for the penicillin or other antibiotics in return for the diagnosis of infection from samples taken by his own veterinary surgeon for a reasonable fee. The types of infection and the treatment required should be discussed by the Ministry with the veterinary surgeon, who could then supervise the treatment on the farm.

I am in no way criticising those who are operating the "survey" and I write only my own opinions. I feel, however, that this is a subject which should be aired and it would be both interesting and beneficial to the profession, the Ministry and the farming community if we could read the opinions of others both for and against.

Yours faithfully,

"Danum," M. A. Horrox.
Breary Lane,
Bramhope,
Nr. Leeds.

March 10th, 1951.

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REACTORS IN ATTESTED HERDS

Sir,—Will you allow me a few lines in *The Veterinary Record* to air a serious complaint? I never thought I should see the day when, as now, it is all too common to find that the *only* reactors in otherwise "clean" herds are those cows purchased at attested sales. Already it is becoming the talk amongst dairymen in this district that there is no certainty whatever of purchasing a "clean" cow from an attested sale! It will do many owners of attested herds irreparable harm if this state of affairs continues.

I suggest that only wholetime Inspectors do the tests of these herds and follow through the disposal of any reactors, plus retests of the herd in the shortest possible time.

It is a smear on an otherwise splendid scheme.

Yours faithfully,

12, Severn Street, R. J. A. Swift.
Welshpool.

March 6th, 1951.

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FOWL PARALYSIS

Sir,—May I thank Miss James for her constructive criticism of my remarks on fowl paralysis. I must confess I had regarded potassium iodide treatment of this condition as rather more of an experimental therapeutic measure than as a practical proposition for everyday practice; in this I was obviously mistaken and in the light of Miss James's experience shall certainly adopt this line of treatment in suitable cases in future.

Would Miss James be kind enough to give further details regarding the clinical condition of the treated birds, *i.e.*, whether they were already losing weight or were off food, etc., and also how long the treated birds were out of lay after clinical recovery?

Yours faithfully,

78, Brentway, Joan O. Joshua.
Finchley, N.3.

March 9th, 1951.

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NOMENCLATURE OF ANIMAL DISEASES

Sir,—As a lover of the English language and its poetic beauty I have every sympathy for Mr. Hanson in his defence of the ancient usage of words, but I feel sure that most of us are anxious for uniformity in the naming of diseases and conditions; not only for our own sakes, as scientists, but also for the sake of our clients, who are often puzzled by the diversity of names for a single disease.

Most of these terms are unscientific, few are descriptive, even to the student of medieval English, and I have yet to discover the poetic beauty of "garget" or "foul."

Let's face it—the old words have had their day!

In the changing face of country life, the literacy of country folk, compared with a few years ago, the modern Farming Press, and the advent of broadcasting by experts in every field, these terms are anachronisms—of museum interest only.

After all, when a farmer in his everyday speech talks about superphosphate, protein and carbohydrate, dominant and recessive, he is entitled to something better from us than "a shot of humour." Nothing could be more humiliating than to mention "felon" to the cowman, and to hear in his reply the words "streptococcal mastitis"!

So much for the "town-bred, synthetic, chromium-plated, cellophane-wrapped love of pseudo-scientific jargon" of Mr. Hanson.

Yours faithfully,

Riverton, Richard W. Hillman.
Boroughbridge,
Yorks.

March 5th, 1951.

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"SERENDIPITY"

Sir,—I have received only within the last two days my copy of *The Veterinary Record*, February 10th. I read the review of Professor Beveridge's book and noted with interest the mention of the word "serendipity." The reviewer states that this word was coined by an American scientist and I cannot let that statement pass without protest.

According to the Concise Oxford Dictionary the word was coined by Horace Walpole after "The Three Princes of Serendib," a fairy tale. My colleague Dr. E. F. C. Ludowyk, Professor of English in this University, informs me that "Horace Walpole used the word for the first time in a letter which he wrote to a friend, his justification for the coinage being the frequency with which Serendib (Ceylon) was described as a magical isle in which such 'happy and accidental discoveries' took place. The scene of Gozzi's play King Stag is laid in Serendib and there, all sorts of wonderful and magical things happen!

"It may be that an American scientist used the word in certain scientific contexts but the credit for its coinage must go to Horace Walpole."

Incidentally, Serendib, an old name for Ceylon, is like the name Ceylon itself, a corruption of the Singhalese name "Sri Lanka Dwipa."

Yours faithfully,

Faculty of Veterinary Science, C. A. McGaughey.
c/o Medical College,
Kynsey Road,
Colombo, 8.
Ceylon.

March 9th, 1951.

N.V.M.A. CONGRESS, 1951

September 23rd - 29th (inclusive)

List of Hotels in Eastbourne

The following is a list of recommended hotels in Eastbourne, giving particulars of their charges, etc. Members are advised to make reservations *as soon as possible* direct to the hotel of choice. Should a fuller list or any other information about Eastbourne be required, this can be obtained on application to the Publicity Department, Information Bureau, Eastbourne (Tel.: 4848).

The headquarters hotel for the period of the Congress and at which most of the evening functions will be held, is the Grand Hotel, Grand Parade, and block reservations of double and single rooms have been made there by the Association. These reservations will be held until the end of July *only*.*

Recommended Hotels in Eastbourne in the vicinity of the Conference Hall (the Winter Gardens) and the Headquarters Hotel

Name and Address	*Inclusive*	† *Bed and breakfast*
Licensed		
Grand Hotel, Grand Parade	36/- to 55/- per day	29/- to 47/6
Cavendish, Grand P'de	35/- to 60/- per day	30/- to 35/-
Imperial, Devonshire Place	7 to 11 gns.	—
Hydro, Mount Road	8 to 12 gns.	—
Kenilworth Court, Wilmington Square	From 7 gns.	17/6
Sea View, Grand Parade	8 to 10 gns.	—
Beaulieu, Grand Parade	8½ to 10 gns.	—
Sandhurst, Grand P'de	From 25/- per day	—
Southdown, Howard Square	7 to 11 gns.	—
Neptune Court, Jevington Gardens	5 to 8½ gns.	15/6
Clarendon, Gildredge Road	7 to 8½ gns.	—
Sussex, Cornfield Terrace	9 gns.	17/6
Clifton, South Street	7 to 10 gns.	—
Hotels and Private Hotels		
Lansdowne, Grand Parade	7½ to 11 gns.	19/6
Haddon Hall, Devonshire Place	7 to 10 gns.	—
West Rocks, Grand Parade	6 to 10 gns.	—
Wish Tower, Grand Parade	7 to 10½ gns.	21/-
Queensborough, Grand Parade	7 to 10 gns.	15/6
Oban, Grand Parade	7 to 10 gns.	—
New Wilmington, Compton Street	7 to 9 gns.	18/6
Quendon, Carlisle Road	6 to 7½ gns.	—
Lynwood, Jevington Gardens	4½ to 7½ gns.	—
Lamont, Wilmington Square	7½ to 9 gns.	—
Caithness, Wilmington Square	7 to 9 gns.	—
South Cliff, South Cliff	6 to 8½ gns.	13/6
Shirley Court, Hardwick Road	6 to 8 gns.	—
Lathom House, Howard Square	6 to 8½ gns.	15/6
Stanley House, Howard Square	7 to 10 gns.	15/6
Whitehall, Howard Square	6 to 9 gns.	—
Ben Reay, Carlisle Road	6 to 8 gns.	—
Marden, Carlisle Road	6 to 7½ gns.	—
Medwyn Court, Carlisle Road	5½ to 6½ gns.	—
Southborough, Carlisle Road	5½ to 7 gns.	—
Alwyn, Jevington G'dns	6 to 7 gns.	—
Brooklyn, Jevington Gardens	7 to 8 gns.	—
Candar, Jevington G'dns	5 to 6½ gns.	—
The Chimes, Jevington Gardens	5½ to 6½ gns.	—
Elmscroft, Jevington Gardens	5 to 5½ gns.	—
Fairlands, Jevington Gardens	5 to 6½ gns.	—
Hazelhome, Jevington Gardens	From 5½ gns.	—
Jevington Guest House, Jevington Gardens	5 to 6 gns.	—
Kuvee, Jevington Gdns.	From 4½ gns.	—
Little Seeleys, Jevington Gardens	5 to 7 gns.	—
Morningside, Jevington Gardens	From 5½ gns.	—
Rosforde, Jevington Gardens	5 to 5½ gns.	—
Springhaven, Jevington Gardens	5 to 6½ gns.	—
Sussex Guest House, Jevington Gardens	4½ to 6 gns.	—
Tor View, Jevington Gardens	5½ to 6½ gns.	—
East Mullion, Lascelles Terrace	7 to 9 gns.	—
Mowbray, Lascelles Terrace	5 to 7 gns.	—
Revelstoke, Lascelles Terrace	6½ to 7½ gns.	—
South Lynn, Lascelles Terrace	5½ to 6½ gns.	—
Edenhurst, Wilmington Gardens	5½ to 7 gns.	12/6
Farrars, Wilmington Gardens	5 to 6½ gns.	—
Kingscourt, Wilmington Gardens	5 to 7 gns.	12/6
Park View, Wilmington Gardens	5 to 6½ gns.	—
Travancore, Wilmington Gardens	5 to 6½ gns.	—
Devonshire Court, Wilmington Square	5 to 7 gns.	—
Ellesmere, Wilmington Square	5 to 7 gns.	—
Faircroft, Wilmington Square	6 to 8 gns.	—
Southview, Wilmington Square	6 gns.	—
Country Accommodation		
Birling Gap Hotel, Birling Gap, East Dean	8 gns.	
Woodside, Hailsham	From 6 gns.	
Glyndley Manor, Hankham, Hailsham	From 8 gns.	
Chalk Farm, Willingdon, Hampden Park	From 6 gns.	
Martlets, Pevensey Park Road, Pevensey	5 to 5½ gns.	

* In booking at the Grand Hotel, if attendance at the N.V.M.A. Congress is mentioned, special terms will be allowed.

† The hotels indicated offer bed-and-breakfast accommodation at the terms quoted, but only for odd nights and not for full week bookings.